

Science ILLUSTRATED

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DR. GERALD WENDT'S

Ten Science Highlights

OF 1946



How to complete your Thanksgiving picture

1. You start by placing a bottle of Kinsey on the table. This superb whiskey is so light and mellow, so pleasing to the taste, that it goes a long way toward solving your holiday entertainment problem.



KINSEY

BLENDED WHISKEY

the unhurried whiskey
for unhurried moments

Since 1892

2. For the guest who likes highballs, you just add ice and soda to a couple of ounces of full-bodied Kinsey, and place the amber-colored nectar into the waiting hand.



3. Manhattan fans are usually fussy. So make your Manhattans with smooth, rich Kinsey and complete the picture of Thanksgiving contentment.



86.8 Proof. 65% Grain Neutral Spirits. Kinsey Distilling Corp., Linfield, Pa.



New car by B.F. Goodrich shows how to make a bump behave

A typical example of B. F. Goodrich product development

IT's a new kind of car built by B. F. Goodrich, but only one will ever be made. It has parts of six popular cars, put together just to demonstrate a new kind of spring. That spring, made of rubber, will add more to your riding comfort than anything since the air-filled tire replaced the solid tire years ago. It's already in use on many of the newest busses.

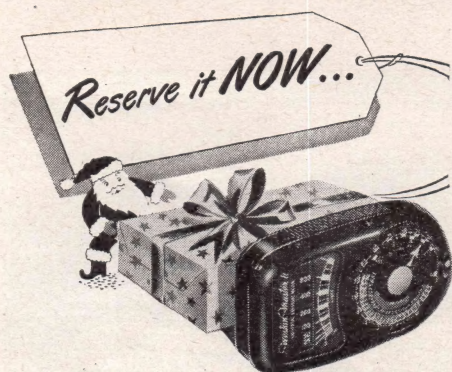
It eliminates the last metal-to-metal contact between rough road and car frame. It consists of a metal cylinder

filled with rubber, with a shaft in the center—with the rubber firmly bonded to both cylinder and shaft. The weight of the car connected to the shaft makes it turn inside the cylinder, gives a twisting action to the rubber. The bumps and road shocks that wear you out in driving with regular springs are smothered by the soft, twisting rubber before they reach the car frame.

Naturally, this new car rides on the new B. F. Goodrich tire that outwears prewar tires, has Koroseal uphol-

stery and uses 13 other standard B. F. Goodrich products. Now it's being lent to car manufacturers who are running tests to see just what they need to do to fit the rubber spring into their own future designs. It's typical of the research that has brought so many new developments in rubber, and constant improvement in standard products. *The B. F. Goodrich Company, Industrial Products Division, Akron, O.*

B. F. Goodrich
RUBBER and SYNTHETIC products

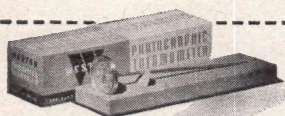


for the Holidays!

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SCIENCE ILLUSTRATED

VOLUME 1 • DECEMBER, 1946 • NUMBER 9

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Anti-freeze from Christmas Trees

This arrangement of pipes and valves is known in the oil and gas industry as a "Christmas tree." The "Christmas tree" is at the head of the well and controls the flow of oil and gas as it comes out of the ground.

There's a close connection between "Christmas trees" and the Nor'way* Anti-Freeze that again will keep countless automobile radiators from freezing this winter. For Nor'way is produced from methanol which Commercial

Solvents makes by processing natural gas.

You can give your car a Christmas present straight from the "Christmas tree" by protecting it with Nor'way or one of CSC's other anti-freezes.

CSC anti-freezes also include PEAK* for permanent, all-winter protection; and Ajax*, the reliable anti-freeze with evaporation retardant.



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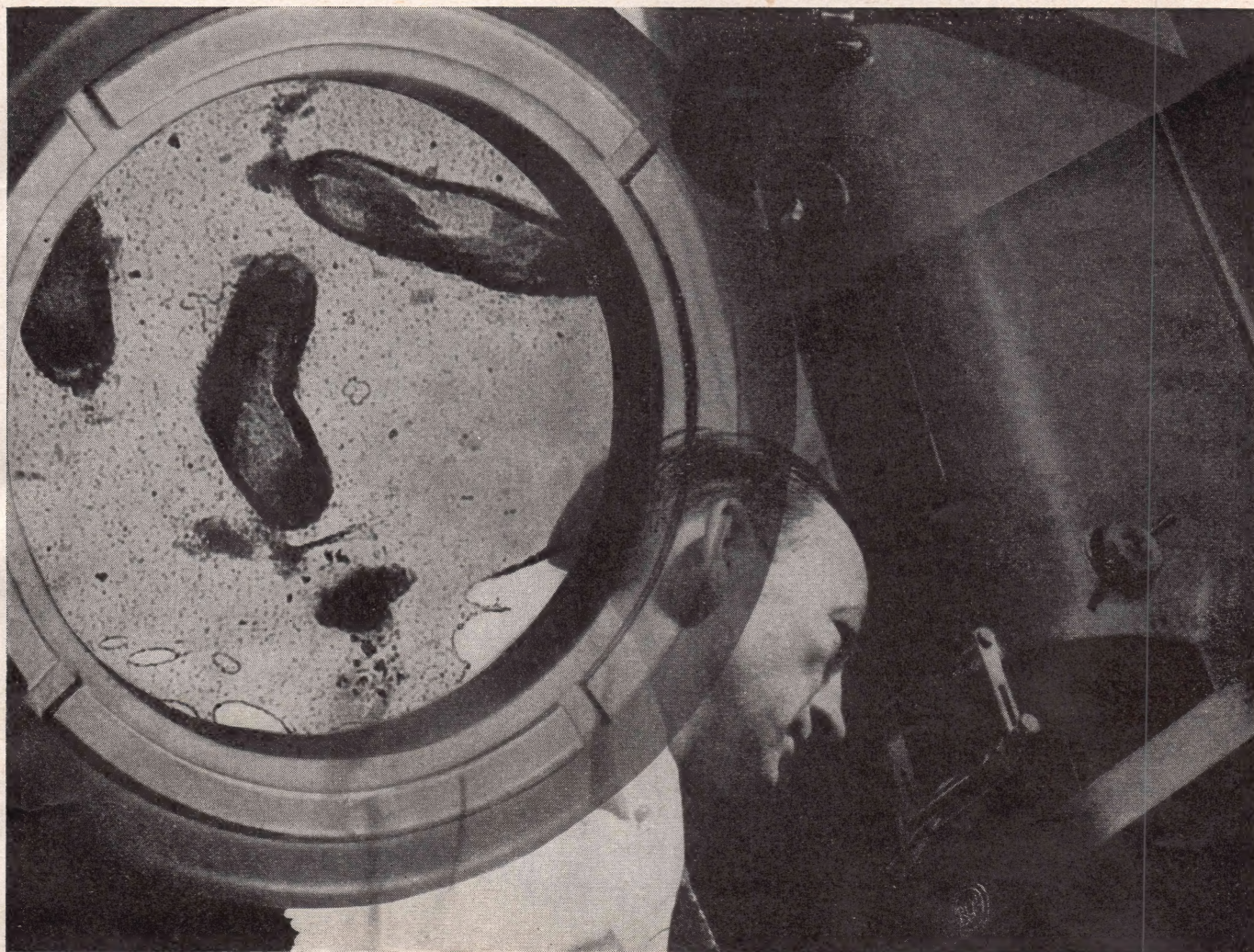
SCIENCE QUIZ

(Correct answers will be found on page 13)

- 1 Wearing glasses, one sees a flash of lightning (a) sooner than without them (b) at same time (c) later.
- 2 Thunder, the loudest common noise, can be heard as far away as (a) 10 miles (b) 20 miles (c) 50 miles.
- 3 How many stomachs has a cow? (a) one (b) two (c) three (d) four.
- 4 People beyond the age of 30 have the best prospects for long life if their weight is (a) above average (b) average (c) below average.
- 5 "Invisible" glass in store display windows is produced by (a) coloring the glass (b) curving it slightly (c) coating it with a thin, transparent film.
- 6 Corned beef is red because (a) it is uncooked (b) red coloring has been added (c) a chemical reaction makes it red (d) it is the color of blood.
- 7 A man at rest breathes about (a) 16 times a minute (b) 27 times (c) 35 times.
- 8 What part of the heat given off by coals in an open fireplace goes up the chimney? (a) 20% (b) 50% (c) 80%.
- 9 Soap cleanses because (a) it makes foam (b) it is an emulsifying agent (c) it is alkaline.
- 10 Under sodium-vapor lamps, colors that show up best are those containing (a) red (b) yellow (c) blue.



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A new weapon "pointed at the heart" of tuberculosis!

This improved RCA Electron Microscope can recognize 50,000 distinct particles in the width of a hair!

Through such magnification, never before possible, science can now examine the structure of the tuberculosis bacillus (shown above)—in its vital search to learn why these organisms behave the way they do.

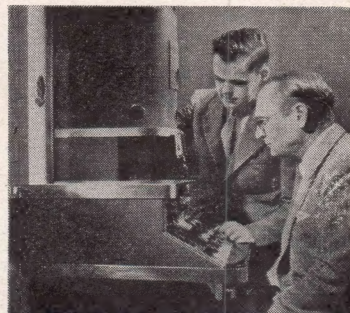
Until the electron microscope came to the aid of disease fighters, scientists had seen this bacillus only as pin-point specks in optical microscopes. Today they can examine the membrane, body structure and details of this killer.

New knowledge of the fine structure of

viruses and living cells will also be of inestimable value in the battle against still unconquered diseases.

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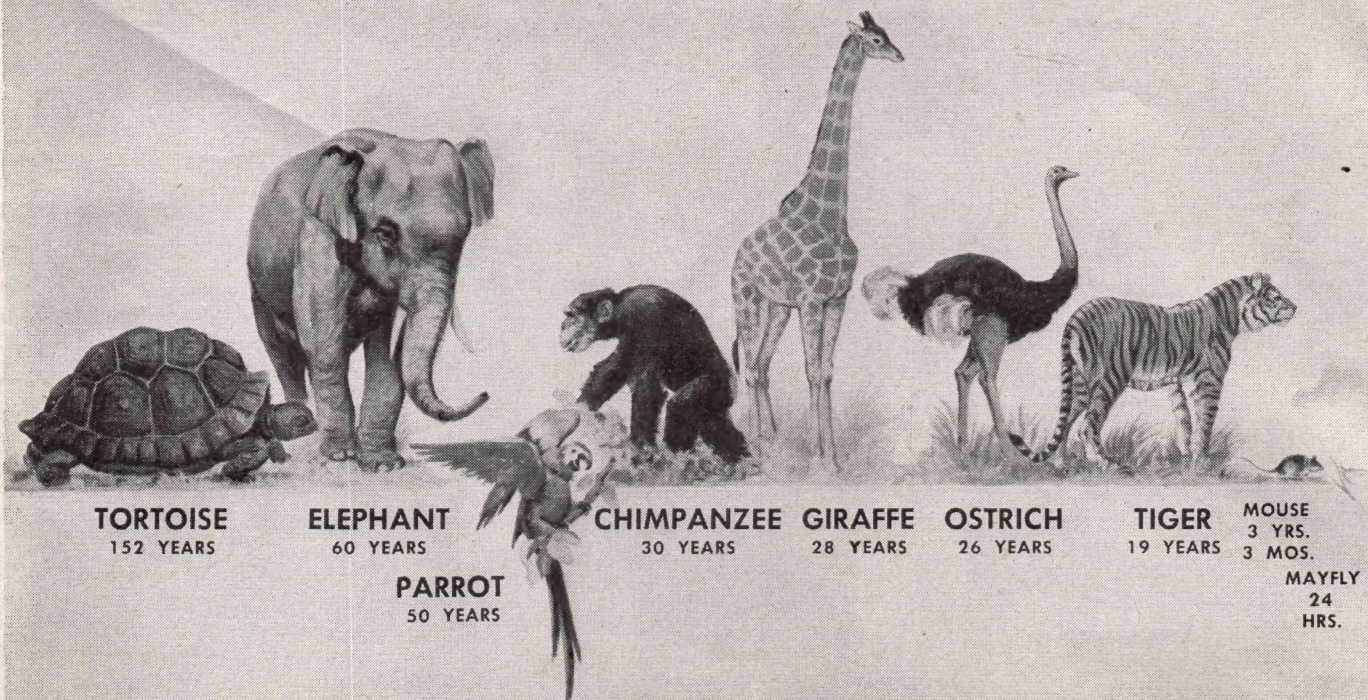
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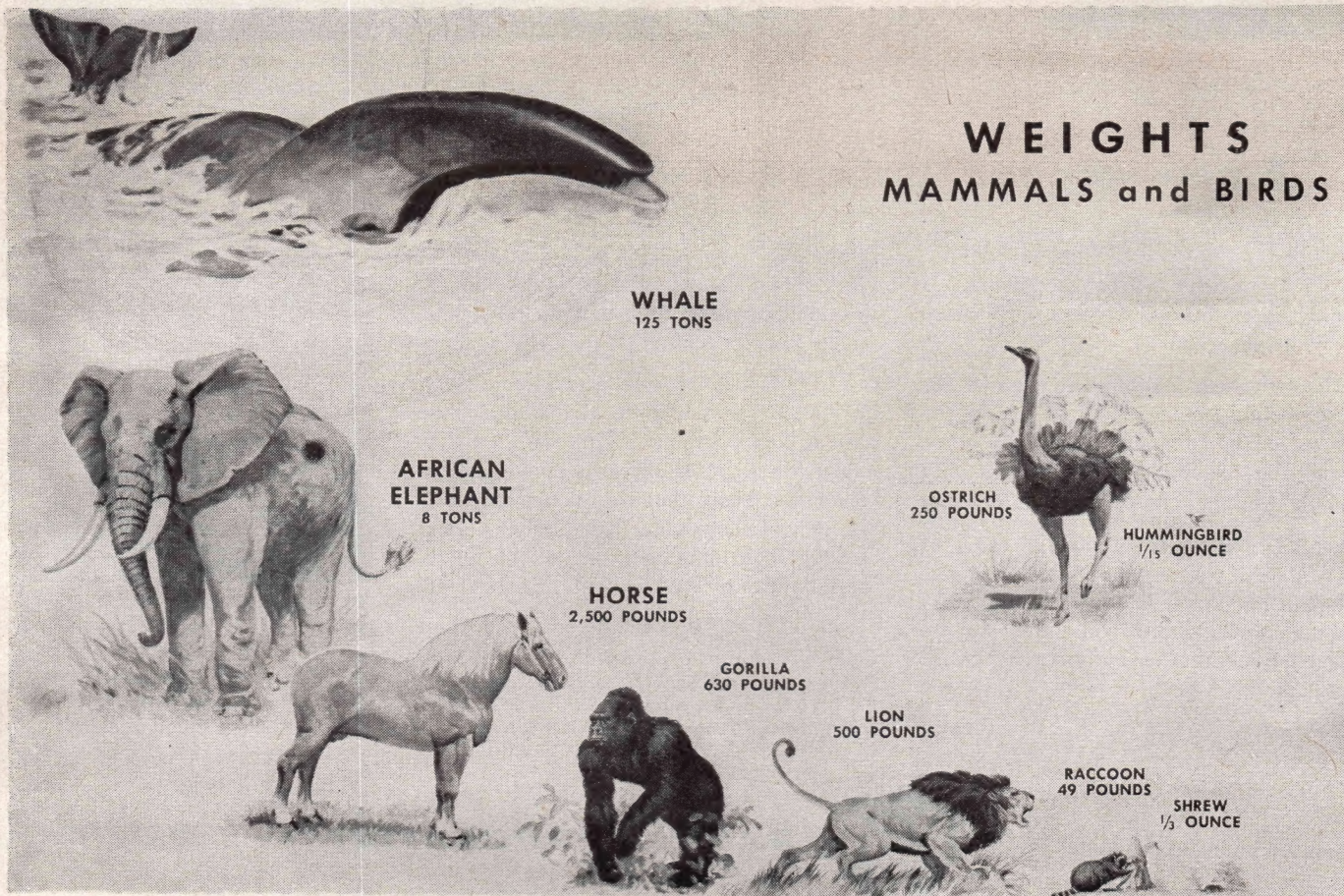
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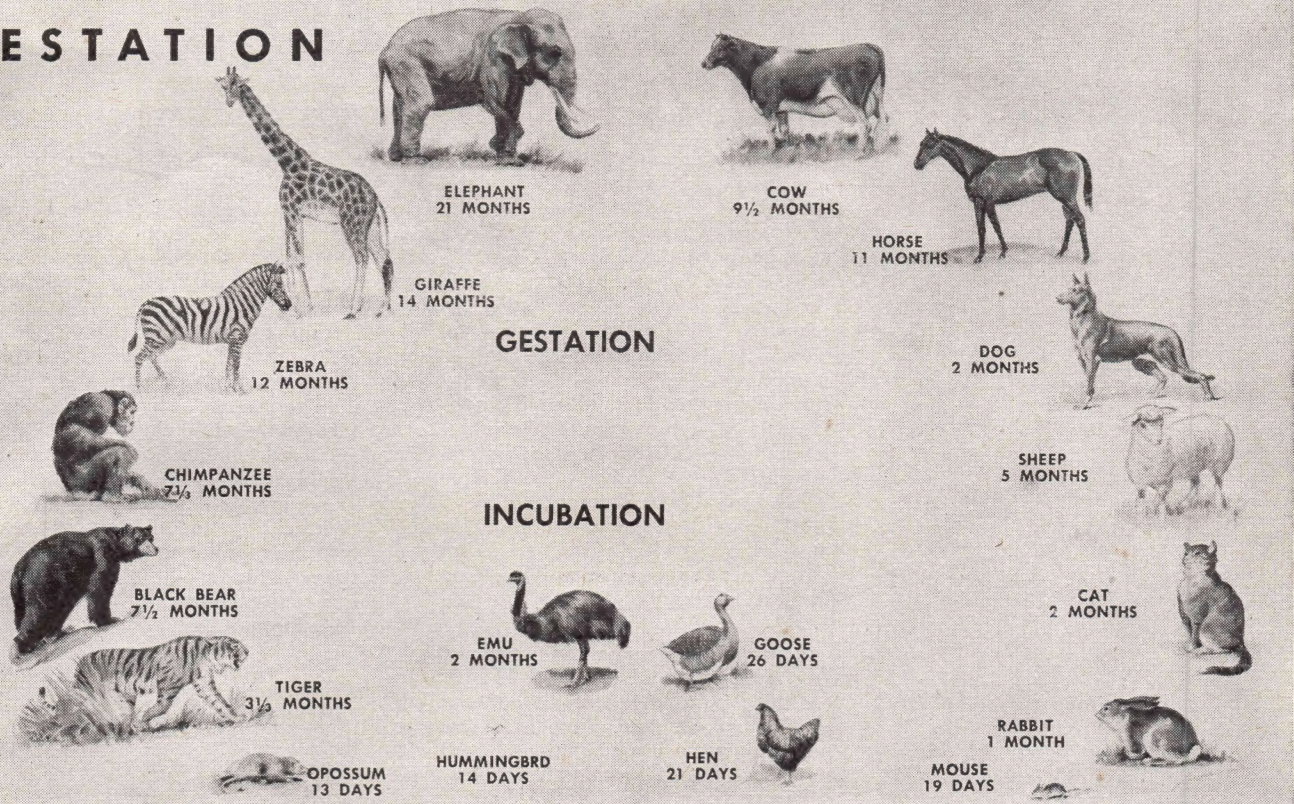


New York Zoological Society

Zoo Who's Who in Murals



GESTATION



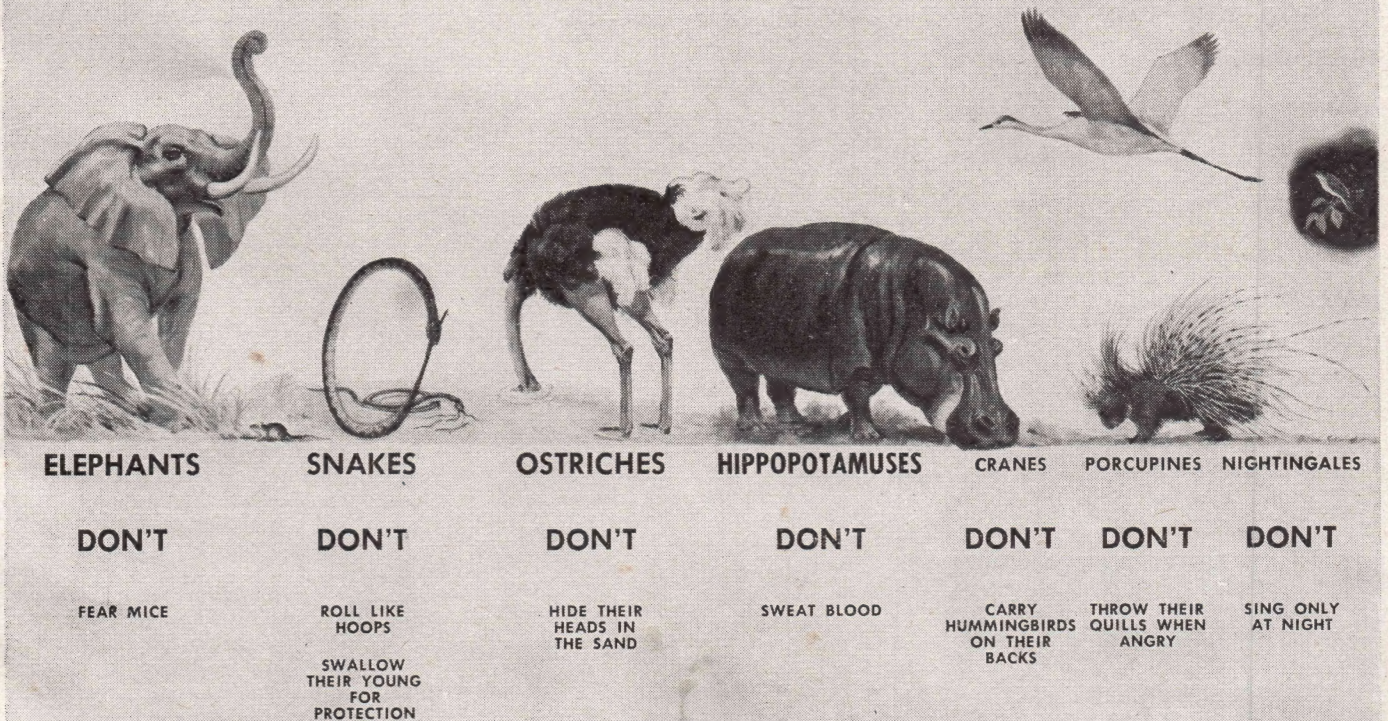
GESTATION

INCUBATION

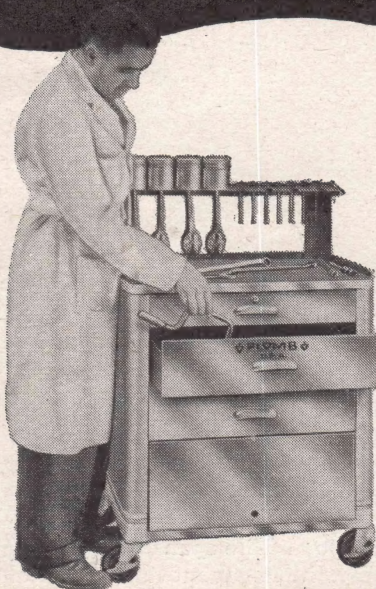
How much does an elephant weigh? How long does it live? How long does it carry its young? Is it really afraid of mice? Most of the questions asked of long-suffering attendants at the New York Zoological Park (Bronx

Zoo) have to do with animals' life spans, weights, periods of gestation, and superstitions about them. Murals by Matthew Kalmenoff in Question House, the zoo's information center, give graphic answers to common queries.

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THE ICECAP MELTETH

I read your item on "Why the Ice Age?" in "The Month in Science" (SI, October). Prof. Lewis's explanation of how the ice accumulated at the poles and why it stopped is plausible enough. But the explanation of how the water got back into the oceans is not at all convincing. A more plausible explanation, it seems to me, would be that the snow and ice piled up around the poles until its great weight caused great and sudden sinkings over large areas—which generated enough heat to melt the ice. Accompanying volcanic activity helped, and the ice floated off. When a great deal of the weight was taken off the poles, the ground would be elevated again and more ice would move toward the temperate zones.—Wm. Crocker, Prescott, Ariz.

FROM THE AFRICAN BUSH

I have seen by chance an odd number of your splendid magazine and I dare to write to you in my bad English (you will not mind, I am a French missionary) and ask you if you could kindly find a good person who would accept to remain his one magazine to us, for God's sake! We are so deprived of spiritual food here in this faraway African bush and little by little we become intellectually impoverished. It is a sacrifice, like many others for us, of course, but I hope maybe your good heart will understand.—Father Jean Delmer, Bukoba, Tanganyika, Africa.

One of SI's editors has arranged for Father Delmer to receive the magazine regularly, wishes him well.—Ed.

ICE-CREAM MIXUP

I note an error in your answer to question 9 in October's Science Quiz. You say that a gallon of ice cream—made of dairy products—weighs about eight pounds, while a gallon of water weighs 8.3. Ice cream mix not only contains dairy products, however, but about 14% sugar, thus making the total weight of the mix greater than that of water. . .

I thoroughly enjoy every issue of your magazine. It fills a real niche in the required reading of those working in the science field.—Russell T. Des Jardins, Mohawk College, Utica, N. Y.

. . . The weight of a gallon of ice cream mix runs from 8.92 to 9.16 per gallon.—A. J. Smith, New York, N. Y.

Ice cream mix after sugar has been added does weigh more than water—not less, as SI stated. But the answer given to the question is correct. Adding an equal amount of air in the form of tiny bubbles cuts down the weight of ice cream to about 4.5 pounds to the gallon.—Ed.

LETTERS

NONTOXIC FREON

In your article "What Can the Atom Do for You?" (SI, June) you say: "Industries needing mass refrigeration will be safer from leaks of toxic gases like fluorine compounds, thanks to tracer techniques in leak detection and corrosive-resistant pipes."

The "Freon" refrigerants I have been selling for 15 years are also known as "fluorine compounds" and, in fact, are the only refrigerants that contain fluorine. In the sale of more than 150,000,000 pounds of these compounds we have yet to have a substantiated case of injury and, as you know, they are sold on the basis of non-flammability and nontoxicity as well as for their inherently good qualities as refrigerants.—W. W. Rhodes, Sales Director, Kinetic Chemicals, Inc., Wilmington, Del.

SI's apologies. "Fluorine compounds" should have read "chlorine compounds." Freon, the only fluorine refrigerant, is indeed nonflammable and nontoxic; it requires no safety measures.—Ed.

TOO MANY GIRLS?

The first issues of your magazine have just finished making the rounds of my family. The reaction was favorable. Everyone found something of special interest and we all enjoyed the rest of the material.

I think that the covers on the earlier issues were to be preferred over the later ones. I appreciate pictures of pretty girls, but on magazines like *Life* or *Look*. How about covers showing photographs of the planets, or artificial or natural wonders of the earth, such as the pyramids, Mammoth Cave, etc.?—Albert F. Lopez, Binghamton, Me.

Gentlemen, please! Desist from using ladies on the covers of your magazine. Leave that to the femme journals. You had a beautiful subject for a cover design in the article on ultraviolet light in September. And an appealing title ("Rainbows in the Earth"), a spread showing minerals fluorescing—and there you are.—Thos. W. Benson, Philadelphia, Pa.

SCIENCE FICTION

I can't claim that I read your magazine regularly, but by accident I did read "The Science in Science Fiction" by Groff Conklin (SI, July). Mr. Conklin is right when he refers to the amateur scientists who turn to science-fiction writing. It's a great hobby. I should know, for I'm one of those hobbyists. It is the real scientists, though, who give the pulps class. Readers are truly grateful to them for leaving their absorbing work to present us with a bit of their vast knowledge in such an entertaining form.—Cpl. Richard W. Bigelow, Keesler Field, Miss.



Allergy is a sleep thief!

Yes, a thief who steals precious hours of rest—and he's hiding right in her own pillow.

In the form of feather dust and other organic dusts, he makes night a misery for those afflicted with certain allergies that result in labored breathing.

But now, science has put this nightly thief to rout! Luxuriantly comfortable pillows that eliminate the source of irritant pillow dusts are now available.

These new pillows are filled with Fiberglas—*super-fine fibers of glass*, as soft as down, that cannot give off harmful dust.

In this new application of Fiberglas, everyone can enjoy the luxury of resilient pillows, because the value of these modern home accessories *is not limited to allergy sufferers alone!* They are clean, light, springy,

shape-retaining, an investment in good sleeping!

This new discovery further indicates the increasingly important contributions that Fiberglas, and products made with Fiberglas, are making to better living. Watch for mattresses and comforters made with this new form of Fiberglas.

Fiberglas is the trade name for these non-allergenic pillow fillings and for many other products made of light, strong, moisture and heat-resistant ageless glass in pliable fiber form.

Ask for Fiberglas in the things you buy. Consider it to improve the things you make. Write Owens-Corning Fiberglas Corporation, Department 800, Toledo 1, Ohio. Branch offices in principal cities. *In Canada, Fiberglas Canada Ltd., 1200 Bay St., Toronto, Ont.*

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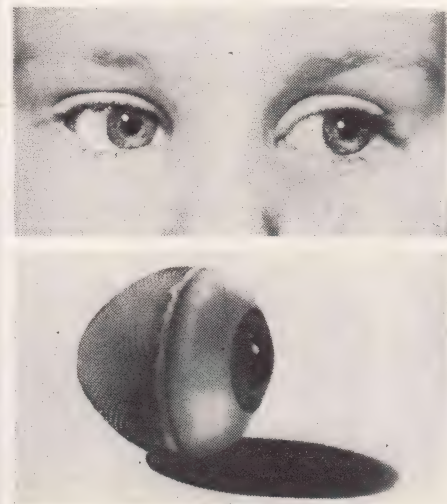
Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL Company. Picture of Jerry, sent on request.

Medical Newsnotes

By BARRY COMMONER

MOVABLE PLASTIC EYE

A frozen, motionless stare usually destroys the illusion of the most lifelike artificial eye. Now a new plastic eye, developed by Dr. A. D. Ruedemann, of the Cleveland Clinic, can be made to move in harmony with its real mate. To produce natural movement, the patient's eye muscles are sewn to the back of the false eye. Thereafter, the four muscles attached



to the artificial eye, acting in parallel with the muscles of the normal eye, cause both eyes to move at once. The muscles are fastened to a fine mesh of tantalum wire which covers the back of the new eye. The attaching threads are also of tantalum, a rare metal which causes little harm when embedded in human tissues for long periods of time. So far, over 200 people have been fitted with the device.

NAZI "SCIENCE"

Justice is about to catch up with the German physicians who, under the guise of experimentation, performed shockingly inhuman experiments on inmates of concentration camps. At a trial before the Allied Tribunal in Nuremberg, the doctors will be accused of hundreds of murders resulting from exposing men to prolonged ice baths, brutal sterilization of women, and deliberate inoculations with fatal diseases. The "researchers" were supposed to be studying the effects of freezing and various diseases on the human body, but Allied scientists could find little evidence of scientific procedure in their "laboratory" records.

NEW ANTIBIOTICS

Two new antibiotics are reported from laboratories in India and Russia. Prof. S. R. Bose, of Carmichael Medical College, Calcutta, has prepared an antibacterial substance from a mushroom which grows on decomposed wood in Indian forests. The antibiotic, called "polyporin" after

the scarlet-red fungus, has been successful in treating cholera and typhoid infections. Although delayed by inadequate laboratory facilities, Professor Bose is working to prepare a pure, concentrated form of the new drug. Dr. G. F. Gause, of the Moscow Institute, reports another antibacterial agent, "colistatin," originating from a bacterium found in Russian soils. Thus far it has been used only to treat experimental infections in mice. The drug is active against relapsing fever, and the bacteria causing typhoid, dysentery, and pneumonia.

PRENATAL IMMUNIZATION

Reports from England tell of an experiment by Dr. William Bethune Scott to determine whether immunization of pregnant women against diphtheria will result in the birth of diphtheria-immune children. It is difficult to immunize children until they are at least six months old, and the experiment, if successful, will make it possible to protect the infants during this danger period. Thirty-seven non-immune expectant mothers volunteered for the experiments in 1945, and the first of their offspring will be old enough to test for immunity in a few months.

BED-WETTING ADVICE

Parents who are worried about their children's bed-wetting get some advice in a recent article by Dr. Clifford Sweet, of Oakland, California. Distressed parents often do not understand that voluntary control of the bladder during sleep arrives at a later age than during waking hours, and so heap shame and punishment on a perfectly normal child. Conscious bladder control develops only after the child is about two years old. Previous training is inadvisable. Many normal children do not develop control until after the fourth birthday. Bed-wetting that persists longer (and does not result from organic disease) is due to psychological problems. Parental impatience may have retarded progress. The child may wish subconsciously to remain in the protected state of infancy; or he may want to get even with parents for constant criticism. Treatment? Parents must help the child grow up, and remove causes of his resentment against them.

ATOMIC-BOMB DAMAGE

Although the Navy is not releasing detailed information on the effects of the Bikini explosion on the many test animals, certain general facts have been made known. Rats appear to be more resistant to atomic-radiation damage than men, and insects are even more resistant than rats. Animals made ill by the bomb explosions were treated with penicillin and blood transfusions. The sex glands of male animals near the center of the explosion area were damaged, resulting in sterility.

ON MAN IN THE UNIVERSE

DON'T let yourself miss the sheer joy of reading Aristotle! Living over 2,000 years ago, he was so far ahead of his era that his ideas are astonishingly timely today.

Aristotle was a mighty pioneer in the field of knowledge. Nature, politics, art, drama, logic, morals—he explored them all, with a mind open to truth and a heart eager for understanding. And this great edition of Aristotle—edited by Louise Ropes Loomis, Professor Emeritus of Wells College—*free to you, as a gift*—is certain to become one of the most prized of all your books!

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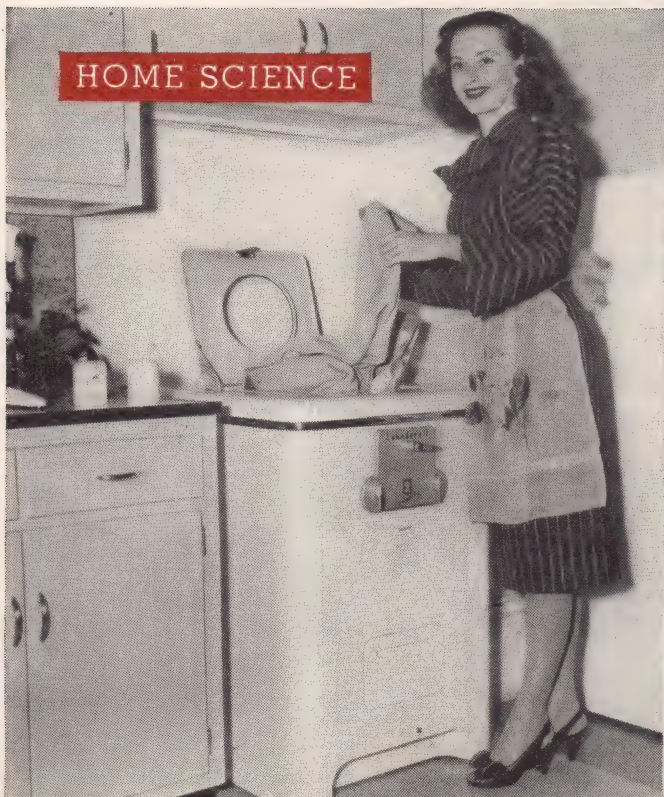
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HOME SCIENCE



LAUNDERALL has latch assuring stoppage of machine if the fill door is opened. Washes by reversing roll, rinses twice, spin-dries, cleans itself, and shuts off, automatically. Cycle, 40 minutes.



BENDIX, improved in 14 ways, comes in either square or round cabinet; machinery is almost identical. It washes, flush-rinses, deep-rinses twice, spin-dries, automatically. Cycle, 49 minutes.

Home Laundries

WASHING machines now on the market show that there is a trend toward redesigning the cabinets to make them harmonize with other kitchen and utility-room appliances.

Awkward forms and metallic surfaces in many makes have given way to square, trim cabinets finished in sparkling, easy-to-clean porcelain enamel. Accompanying this improvement is the

trend away from coaster-mounted machines toward fixed installations.

Behind the modernized exteriors of the laundriers, generally speaking, are a number of late engineering developments that mean savings of time, effort, and cash outlay. Most manufacturers use lifetime-lubricated bearings. Exposed metal parts have been treated to make them corrosion-resistant.

In the fully automatic Bendix washer, for example, water now enters from the top instead of the side and flows through a thermostatically controlled mixing valve. An air gap at the inlet tube prevents back-siphoning.

The Launderall, also fully automatic, has a cylinder geared for a reversing action that prevents bunching or tangling of articles in the wash. Loading from the top eliminates a fair amount of stooping on the part of the machine operator.

The new Norge boasts a plastic rotor with a glass-smooth finish to guard against snagging even the most delicate fabrics. And the rubber pressure rollers for drying have a feather-touch safety release and a pressure selector for various types of fabrics.



THOR WASHES CLOTHES, agitator method, rinses, deep-rinses, spin-dries, automatically. It's kitchen size, table height.



CONVERTED, IT WASHES DISHES. Switch from clothes tub to dishes tub is made in 1½ minutes. The units sell separately.

SCIENCE QUIZ

(Answers to questions on page 4)

1. **B.** The difference is far too small to notice. Light is slowed by glass; its speed is 1.523 times as great in air as in crown glass. So, in the time it takes light to go through eyeglasses 2 mm. thick, it would have gone 3.046 mm. in air. The delay is the time it takes to go the difference (1.046 mm.) in air. But since the velocity of light is 186,000 miles per second, this delay equals only $1/286,173,980,878$ of a second.

2. **B.** There is no record of thunder being heard more than 20 miles away—about 100 seconds after the lightning flash. In hot summer air, sound travels a mile in about 4.5 seconds, in zero weather in about 5 seconds.

3. **A.** One stomach, but divided into four compartments. Swallowed food first goes only into the first and second compartments. Then the cow "chews its cud" and swallows it into the third. Digestion takes place in the fourth.

4. **C.** Mortality rates for people over 30 are lowest when the weight is 10% or 20% below average. Under the age of 30 a small excess of weight shows a lower mortality.

5. **C.** A pane of glass is "seen" by seeing the reflections from it. In some windows these reflections are aimed downward toward the sidewalk by the use of a sheet of glass that is bent in a deep, almost cylindrical curve. But, for flat windows, the reflections are destroyed by coating both sides of the glass with a very thin, invisible film which reflects the light outward from both surfaces so that the wave lengths cancel each other out. Then the glass seems to vanish.

6. **C.** When fresh meat is cooked, the hemoglobin, which colors blood red, is oxidized and the meat turns brown. But when meats are preserved or "corned," chemicals are used which form with hemoglobin a compound that is also red. This compound is so stable that its color is not changed by heat in cooking. Thus, most preserved meats are bright red.

7. **A.** Try it yourself.

8. **C.** About 80% of a coal fire's heat goes up the chimney in warmed air, smoke, and soot. Heat that enters the room is in the form of infrared rays coming from the coals and from the heated stones or bricks. If a fine-mesh screen is used to keep sparks out of the room, much of this heat is conducted away and lost.

9. **B.** Suds show that there is plenty of soap present, but serve no purpose in cleansing. Many modern sudless soaps are just as good. Soap acts by emulsifying grease (SI, July).

10. **B.** Sodium lights give only yellow rays. So, only colors containing yellow look natural under them. (See page 33.)

NEW! POWERFUL!

ONE-UNIT HEARING AID ALMOST 60% SMALLER!



*This is all you wear
No separate battery pack
No separate battery wires*

Yes—now you can wear a hearing aid with complete comfort and ease. The tiny new Beltone Mono-Pac is about 1/3 size and weight of old style hearing aids—actually little larger than a deck of playing cards, yet so powerful you hear even whispers clearly! Get helpful facts about this new "miracle" aid in valuable FREE book about deafness.



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**COMING
ATTRACTIONS**

**Look for these
in JANUARY
and later issues**

FOOD AND YOU

Getting what we want to eat is a problem in this country. Getting *enough* to eat is a world problem. The world food shortage is a challenge to science. A forthcoming article discusses food in terms of increased production, improved processing, new methods of preservation.

HOUSING AND YOU

Whether you are planning to build, remodel, install new lighting fixtures, or merely make a bookcase for that corner by the fireplace, you'll find a wealth of useful information in the SI housing articles which will appear regularly in future issues. Each article includes a house plan and also indicates how the latest housing equipment can be incorporated in the house-of-the-month or in your own home. There will be other suggestions for items you can build for yourself or have built for you.

PRIMER FOR SKIERS

You'll have more fun on skis if you start right. An article in the January issue goes into the science of skiing for beginners. It's illustrated in full colors.

NEW DESIGNS FOR LIVING

After reading the story of Henry Dreyfuss, eminent industrial designer, in this issue, you'll want to see what other well-known designers are planning for our future. The next article in this series deals with the shapes of things to come as visualized by Walter Dorwin Teague.

**Science
ILLUSTRATED**

Science Illustrated Survey

Presented to show how Americans react to the many complex factors of life in this age of science

LIE DETECTORS ARE FAVORED IN PUBLIC POLL

Lie detectors have been used recently in a number of criminal cases. Do you think they should, or should not, be used?

	MEN	WOMEN
Should be used.....	52.1%	63.5%
Should not be used.....	31.4	25.5
Depends on case.....	.7	.5
Don't know.....	15.8	10.5

Why it SHOULD be used:

Means to stop crime.....	22.6	24.3
If it helps.....	5.7	9.8
Proved accurate, effective.....	8.8	12.3
Use merely as aid.....	3.8	3.4
For psychological effect.....	1.2	1.9
For severe cases.....	.9	.6
If not harmful.....	.7	1.5
With individual's consent.....	.6	..
Had personal contact.....	.3	.2

Why it SHOULD NOT be used:

Not proved or sound.....	11.5	11.0
Not accurate.....	7.7	6.5
Not fair.....	4.6	2.0
Interferes with nature.....	2.4	2.4
Might be harmful.....	.6	.6
No legal status.....	1.7	.9

Miscellaneous answers and "don't know" balance the percentage.

PEOPLE ARE MORE PERPLEXED OVER "TRUTH SERUM"

A drug called a "Truth Serum" has also been used. Do you think it should, or should not, be used?

	MEN	WOMEN
Should be used.....	38.7%	46.2%
Should not be used.....	37.1	34.9
Depends on case.....	.8	..
Don't know.....	23.4	18.9

Why it SHOULD be used:

Means to stop crime.....	18.9	24.0
If it helps.....	4.8	7.5
Proved accurate, effective.....	4.4	5.6
Use merely as aid.....	2.4	.5
For psychological effect.....	.9	1.5
For severe cases.....	.9	.3
If not harmful.....	.8	1.4
With individual's consent.....	.3	.1
Effectiveness of hypnosis.....	.2	.3
Had personal contact.....	.1	.1

Why it SHOULD NOT be used:

Not proved or sound.....	10.8	11.6
Not accurate.....	6.2	6.6
Not fair.....	5.0	2.1
No drug should be used.....	3.0	3.8
Interferes with nature.....	3.0	2.6
Might be harmful.....	2.5	3.1
No legal status.....	2.3	1.0

Miscellaneous answers and "don't know" balance the percentage.

An Invitation To Readers of This Magazine

FROM THE PUBLISHERS OF THE

FUNK & WAGNALLS *New Standard* ENCYCLOPEDIA

Please Accept WITH OUR COMPLIMENTS

Volume One of the New 1946 Edition—Now On Press!

[ALL WE ASK YOU TO PAY IS TEN CENTS TO COVER COST OF MAILING IT TO YOU]

WE ARE now on press with our Fall 1946 Edition of the Funk & Wagnalls New Standard Encyclopedia, which in previous editions sold over 15,000,000 volumes—an amazing record.

This latest edition, newly revised, we have allocated among the newspapers and magazines carrying our Fall advertising program. In accordance with this plan, we have set aside 1,500 sets for readers of this magazine and now invite you to become the owner of a set—making you this extraordinary offer to enable you to become acquainted with the volumes before you decide to buy.

We want to send you Volume I of the set with our compliments. Merely send us 10¢ to cover our mailing cost—more as evidence of your good faith than anything else. This volume is yours to keep without any further obligation on your part. If, after examining Volume I, you want the rest of the 27-volume set, you may receive it at a ridiculously low price through our book-a-week plan, explained later in this announcement. Or, if you want no further books, you merely drop us a post-card saying so, and that ends the matter.

Some Facts About This Encyclopedia

We expect to enclose with Volume I a small pamphlet giving the facts to show that this is one of the finest encyclopedias anyone can buy for home use—unsurpassed by any other at any price.

In the meantime, we want to give you a few of the facts printed in the pamphlet, so as to interest you in taking the trouble to send for Volume I.

The new Fall 1946 Edition contains over 52,000 subjects, covered in separate articles. Compare this with any other encyclopedia in the world. You will find that it is at least 30% more than encyclopedias costing you up to four times as much as ours.

Each volume (comprising about 500 double-columned pages) contains over a quarter of a million words—over 7,000,000 words in all—which will give you some idea of the completeness of coverage of each subject.

Each volume is as up-to-date as human ingenuity can make it. In this edition the subjects have been revised to cover events of this last year, and each volume, as it goes to press, is brought finally up-to-the-minute. Our unique book-a-week delivery plan, bringing you the volumes almost as they come off the presses, makes it the most up-to-date of encyclopedias. Better still—later volumes, delivered to you during this Fall and Winter—will contain events which have not yet occurred!

Easy-Reading, Handy Volumes

Editor-in-Chief of the original edition was Frank H. Vizetelly, the beloved "Viz" of radio fame, and the editor of the unexcelled Funk & Wagnalls New Standard (unabridged)



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Dictionary Surrounded by a host of authorities in many fields, he brought this immense work into being.

But the books are *easy to read!* Your children in grammar and high school can read them, use them with profit. Free of technical detail, abstruse wording and dry-as-dust-research specialist attitude—and free also of concise, over-abbreviated, fact-omitting brevity—this grand encyclopedia will be your rainy evening companion for many years to come.

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With this announcement we offer you a choice between our De Luxe Edition and our Library Edition of the encyclopedia.

The De Luxe Edition, at \$1.39 per volume, is bound in dark blue, leather-grained cloth, stamped in red and gilt, as illustrated here, with head and tailbands, and harmoniously stained page-tops. End papers and frontispieces are color reproductions of woodcuts by Hans Alexander Mueller, renowned artist in that medium, the frontispieces being a set of woodcut portraits of American Presidents.

The Library Edition costs slightly more (\$1.89 per volume plus the same 11c mailing cost), and has all the features described above, plus a more expensive binding. The covers of this superfine edition are in a tan linen-weave cloth, with red and black title panels, decorated with genuine 22 carat gold leaf, bright and untarnishing—making in all an extremely handsome and dignified set of books.

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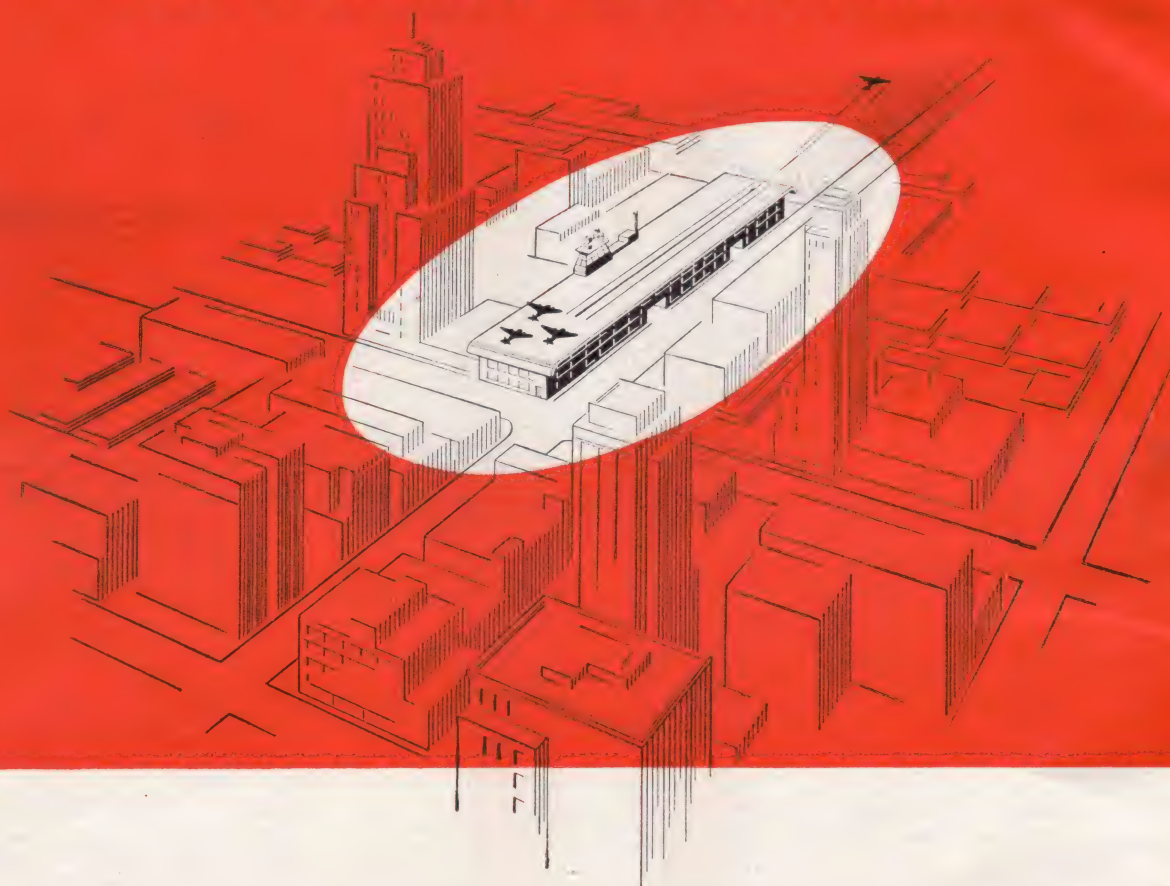
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Here's a great opportunity for *air-minded* citizens



The opportunity is Electropult, a new Westinghouse electrical device with such enormous significance it can well mean the achievement of new goals in living for you, your children and their children.

Opportunity points in three directions . . . social, professional and international, for the Electropult is the long-sought answer to the problem of launching aircraft without using sprawled-out airfields in inaccessible places. The Electropult can launch the largest airliner existing at a speed of 120 miles per hour in a distance of 500 feet. Normally, the take-off

strip for such planes must be 4,000 feet or more.

Here's how you can benefit from this newest triumph in electrical designs: (1) Establish mid-city airports, convenient to all transportation; (2) Wipe out slum districts to be replaced with these mid-city airports; (3) Build floating airports for refueling in mid-ocean to speed international trade, travel and understanding.

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Science Highlights of 1946

Of the thousands of researches that met with success, the 10 listed here most merit the attention of all of us

By GERALD WENDT

OUR way of life, our wealth, our power over nature, our whole understanding of the world in which we live: these have been profoundly affected by this year's advances in science. Therefore, to sharpen public attention to the researches that are always going on, SCIENCE ILLUSTRATED lists 10 of the science highlights of 1946.

Inevitably, nearly all of the 10 advances were stimulated, or even demanded, by the war. The year's most important scientific advance is an outgrowth of atomic-bomb research. Three of the remaining nine are in aviation; four are medical; two have to do with complicated electronic devices.

Some discoveries made in years past have now entered into products available for use by individuals and by industry. Eight of the most important of these *product* highlights are described on pages 24 and 25.

Of the 1946 science highlights, all but one are presented in past issues, or this issue, of SCIENCE ILLUSTRATED. We salute 1947, confident that we shall be reporting on equally important advances in science during the year.

FORESHADOW?

Head and shoulders above all of the year's other scientific events is this: In 1946 basic scientific research in the United States passed, for the most part, into the hands of the Army and the Navy. The two services now spend about \$100,000,000 annually to support research carried on in university laboratories. This is four times the total amount spent on research by the universities themselves in 1938. There is danger, therefore, that the country's research will become reduced to a sector of military effort. Inevitably, military needs will dominate the direction and the free accessibility of scientific research. The consequences will be far-reaching.



THERAPY

RADIO-ISOTOPES

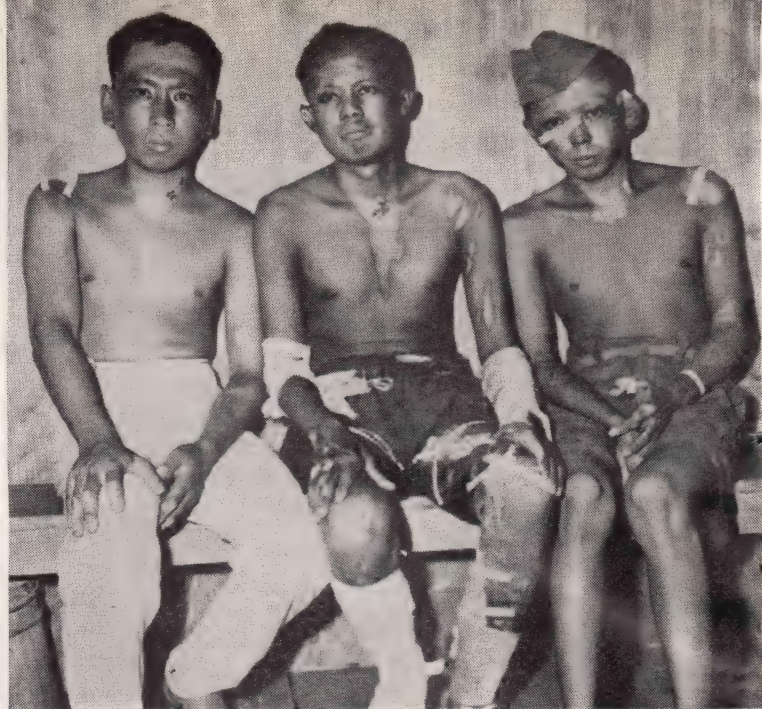
The greatest scientific event of 1946, without much question, was the demonstration at Bikini that the atomic bomb produces enormous quantities of radioactive materials whose rays are thousands of times more powerful than all the radium in the world. Some are produced in the explosion itself; others are produced wherever the rays of the explosion strike so that common elements are transformed into radioactive isotopes, and common materials, like salt or carbon or metals, become radioactive.

This means that the great uranium piles, which have been used to make atomic bombs, can be used to make a host of radioactive products. These, in turn, will have four major uses (SI, June, p. 22; July, p. 28):

In Therapy. Radium has long been used in the treatment of cancer, leukemia, and other diseases. It could seldom be introduced into the body. Now cheap isotopes of iodine, of phosphorus, and of other common elements can replace expensive radium and find their way automatically

NUTRITION

Philip Gendreau, N. Y.



International

WEAPON

to the cancerous cells. A new era has opened. (SI, Oct., p. 32)

As Weapons. After Bikini, Admiral Blandy exclaimed: "This is a poison weapon!" Some of the ships had become so radioactive that they could not be approached for weeks. Many of the severest casualties at Hiroshima and Nagasaki were from the rays. Radioactive isotopes are the newest, and perhaps the worst, possible weapon for war. (SI, June, pp. 51, 94; Oct., p. 25)

In Nutrition. The neutron rays within the uranium pile can also make a form of carbon that is radioactive, and from this can be made radioactive sugar and other foods. Thus it will be possible to trace the exact fate of almost any molecule of food and find where it goes and what it does. Revelations will follow. (SI, Oct., p. 32)

Plant Growth. Many other chemical reactions can be studied by using isotopes as tracers. Plants feed chiefly on carbon dioxide and water in the air, but no one knows exactly how starches and cellulose result. This problem will soon be solved, as will the mechanism of many a puzzling chemical reaction. (SI, Oct., p. 32)

PLANT GROWTH

U.S.D.A. Photo by Lee



THESE SCIENCE HIGHLIGHTS ON YOUR RADIO

"Exploring the Unknown," radio's Number One science program, will dramatize the achievements to which SCIENCE ILLUSTRATED pays tribute on these pages. Be sure to listen Sunday, December 22. You will want to hear these pictures come to life . . . listen to actual sounds of the synchrotron, the ram jet . . . follow the development of flu vaccine. . . .

Produced by Sherman H. Dryer Productions and sponsored by Revere Copper and Brass Incorporated, "Exploring the Unknown" is broadcast coast-to-coast over the *Mutual* network every Sunday at 9 P.M. Eastern Time. Consult your newspaper for your local Mutual station and time.

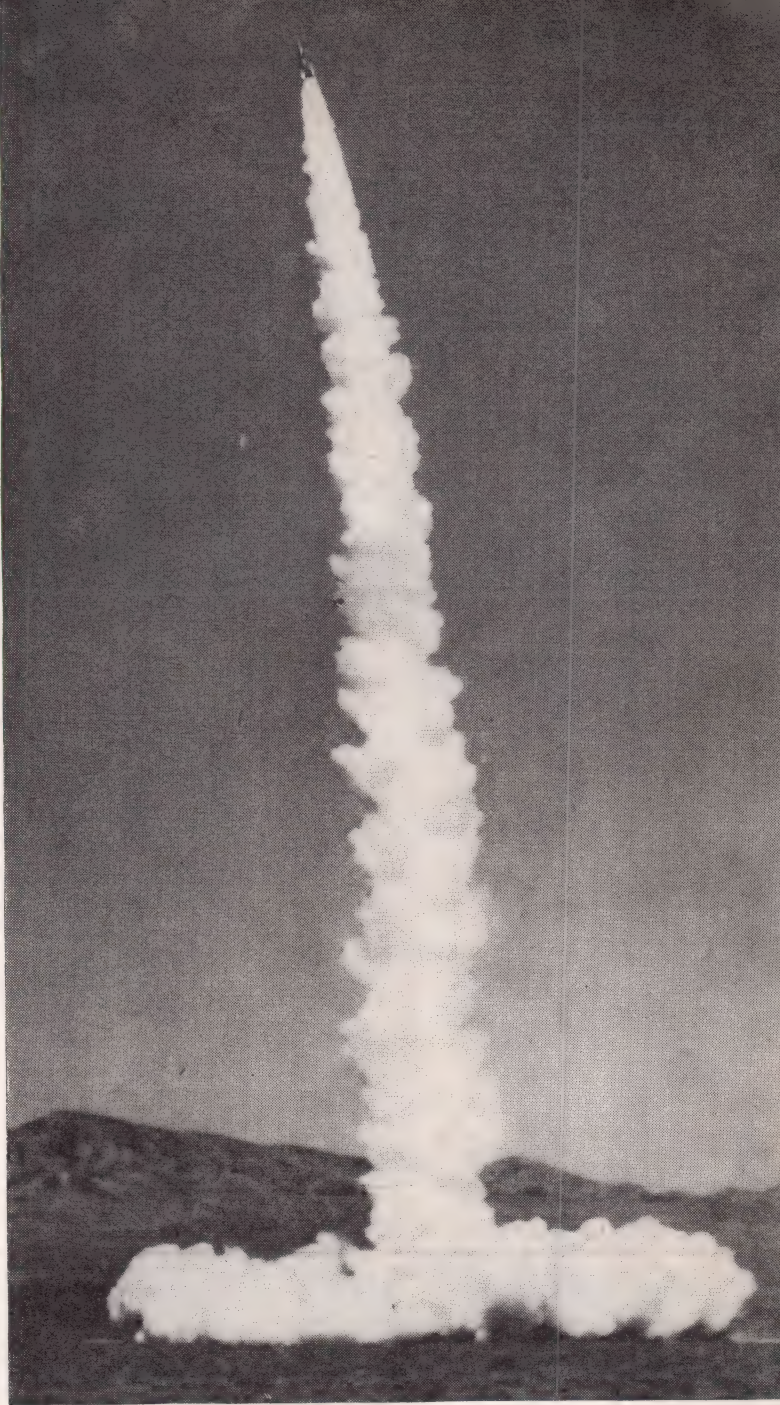
REMOTE-CONTROL FLIGHT

Ready for any future war are various weapons needing neither an accurate artillery-type aim nor a pilot to guide them. The remote control of planes, rockets, and shells in flight embodies many principles and devices that were perfected during the course of World War II but first announced in 1946.

At the right, a V-2 rocket soars skyward; it will make scientific observations for recording by radio at the ground station. Below, right, radio receiving and transmitting devices are fitted into the nose of the rocket before take-off. Below, left, a ground-control flight officer uses a small control panel to operate the crewless plane that is about to take off from a carrier's deck for a test run without benefit of pilot.

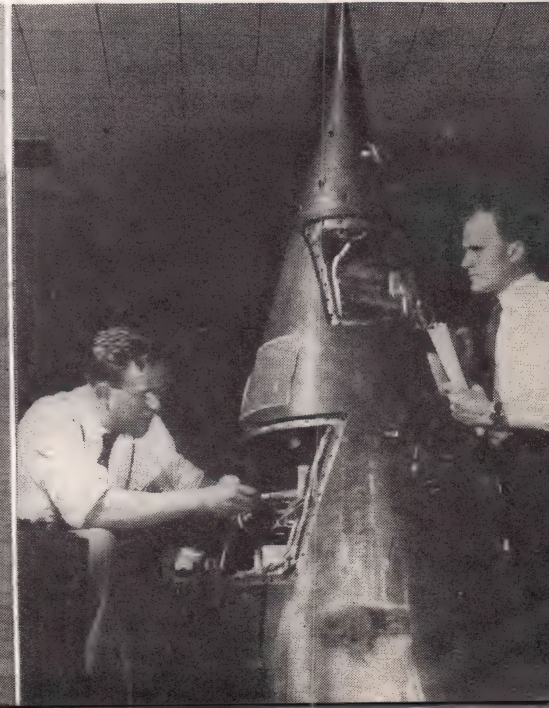
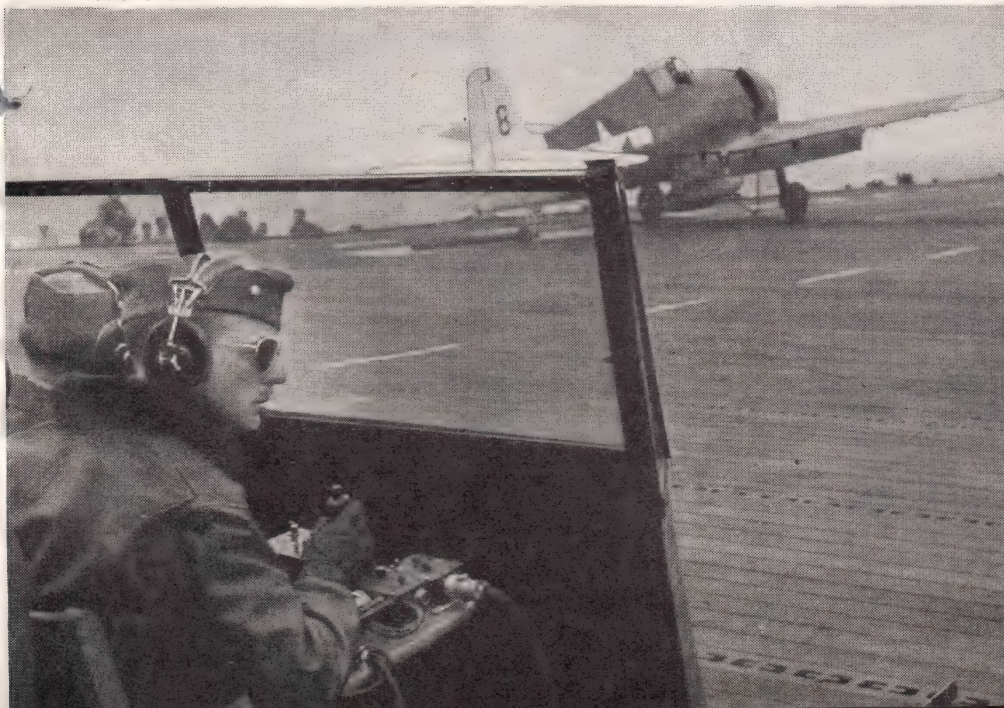
Other automatic and remote-control devices include the proximity fuse that explodes a shell when it has attained proper distance from its target; the control of a drone (crewless) plane by a pilot in another (mother) plane; television cameras, in drone planes, that automatically report what they see to the control planes or to the ground; and the complete long-distance control of rockets by radio and radar. The Germans were far advanced in the development of such weapons; the recent rocket showers over Sweden may be Russian experiments with them. (SI, Nov., p. 40)

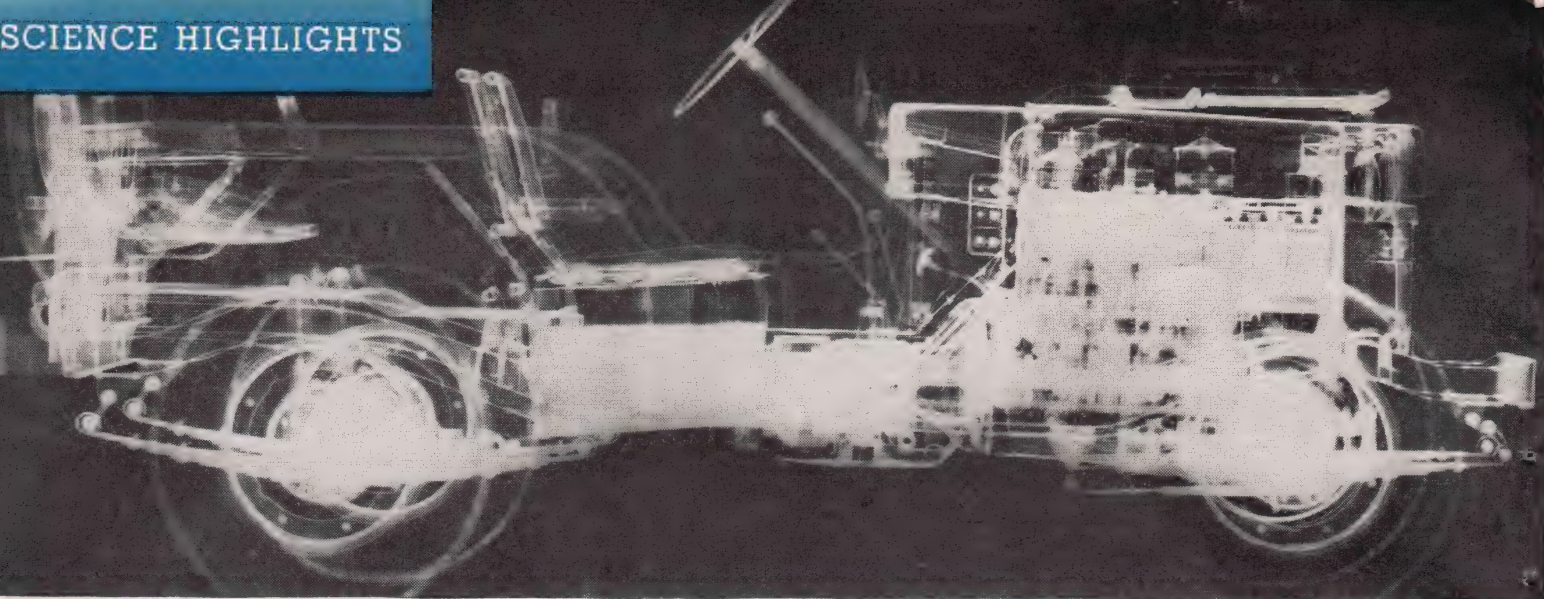
Press Association



U. S. Navy

International





SYNCHROTRON

This newest atom-smasher was first proposed by a Russian, Prof. V. Veksler, who is building a 30,000,000-volt model in Moscow. General Electric's 70,000,000-volt model in Schenectady will be in operation this month. At the University of California a 300,000,000-volt model will be ready next year for the use of Prof. Edwin M. McMillan,

who devised it independently of the Russians. It may later be stepped up to a billion volts, and thus produce energies comparable to the energy of cosmic rays.

The synchrotron whirls electrons in a doughnut-shaped path, and steps up their energy each time around by means of a kick from high-frequency radio waves. Endowed with tremendous energy, the electrons give X rays far more penetrating than those used to show every detail of the jeep in the photograph above. (SI, May, p. 11)

FLU VACCINE

Here is another wartime-research product that will benefit medicine. Sponsored by the Preventive Medicine Division of the U. S. Army, a project set up at the University of Michigan succeeded in preparing a vaccine that may prevent attacks of influenza. The virus, which will grow only in the presence of living cells, is cultured in chick

embryos, is purified and converted into a vaccine by treatment with formaldehyde.

The value of the new vaccine was confirmed by its successful use among student volunteers (below) during influenza epidemics that hit this country in 1945. The public learned about this over last year-end. If the vaccine can be made widely available it can prove an invaluable means of checking the annual spread of influenza. (SI, June, p. 102)

Acme Photo



THE NEW YORK TIMES,
MONDAY, NOVEMBER 18, 1918.

INFLUENZA DEATHS FAR EXCEED WAR LOSSES

Fatalities in 46 Cities Total 82,-
306—Toll in Camps May
Equal Deaths in Battle

Special to The New York Times
WASHINGTON, Nov. 17.—Deaths from influenza in the United States greatly exceeded the deaths among American troops abroad, according to an estimate prepared by the Bureau of the Census. It is also estimated by the Bureau of Public Health that the deaths from influenza are



International



International

NITROGEN "MUSTARD"

The little girl above, doomed by leukemia, a form of cancer affecting white blood cells, might have been saved by nitrogen mustard gas.

Wartime studies at the Army's Edgewood Arsenal, first revealed in 1946, showed that the war gas, when injected in minute amounts, attacks cancer cells and prevents their

further growth. Nitrogen mustard produces effects like those of X rays, which are of proven value in causing inheritable cellular changes and in controlling cancers.

The first reports of clinical use of the war gas tell of "salutary results" in the treatment of Hodgkin's disease, leukemia, and certain other types of cancer. The work holds promise of new progress in the fight against cancer, and new information on the mechanism of heredity. (SI, July, p. 83)

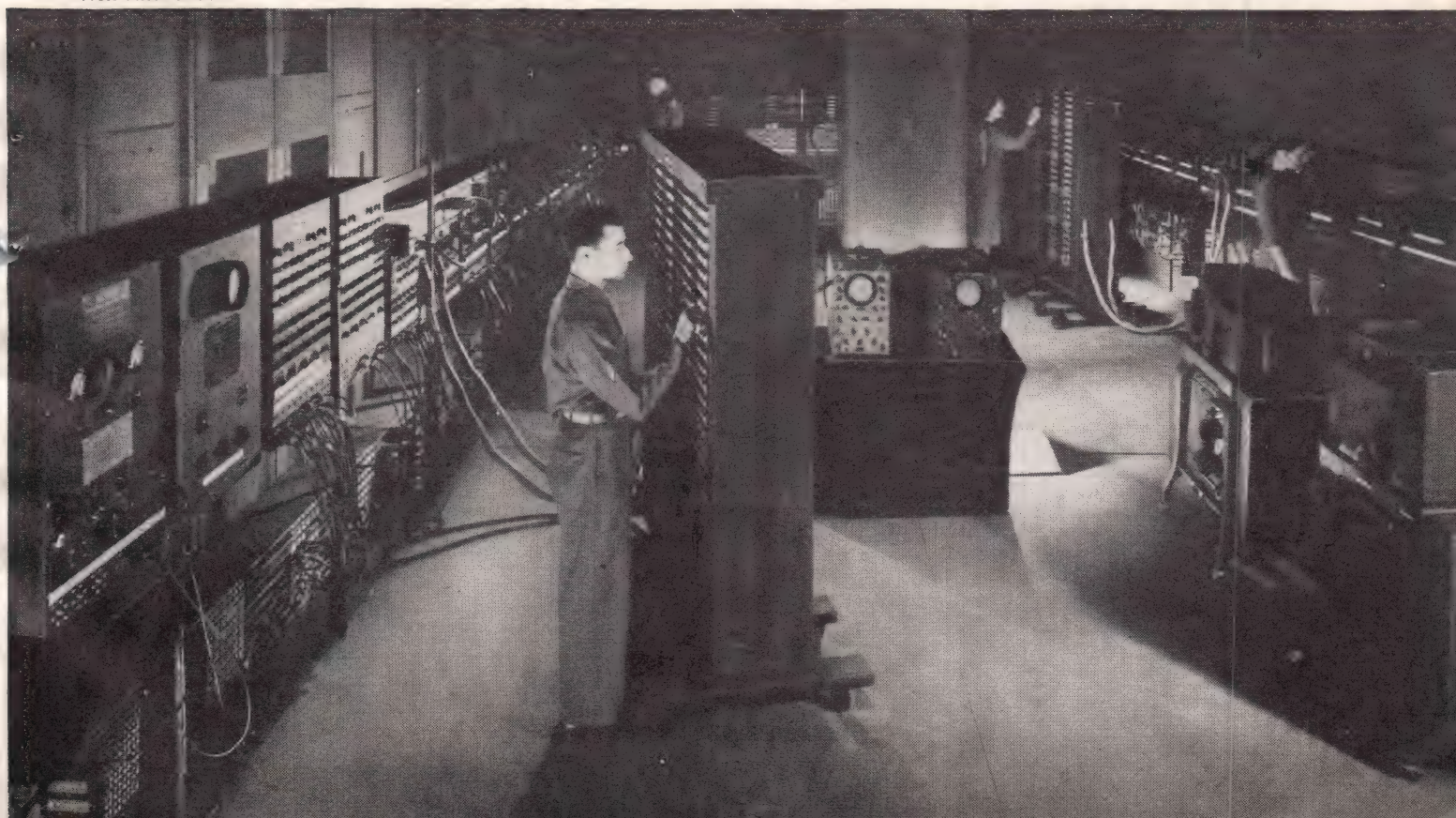
ENIAC

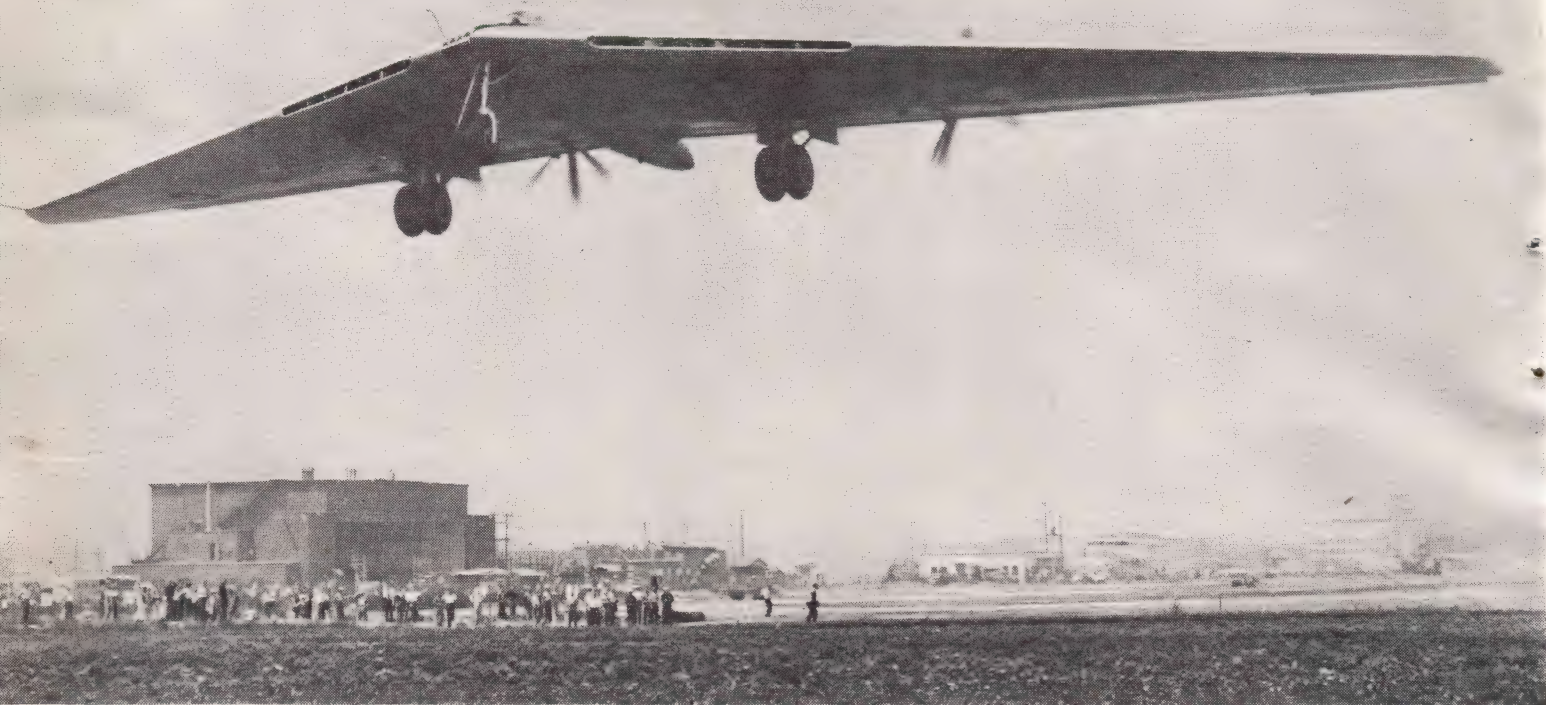
The full name of this phenomenal thinking machine is Electronic Numerical Integrator And Computer. It can calculate more accurately and almost incredibly faster than any mathematician. Some scientific and engineering calculations would require weeks and even years if done with pencil and paper, but ENIAC can do them in minutes or

seconds. It can add two 10-digit numbers in 1/5,000 of a second. It can store (remember) 500,000 yes-no facts or 10,000 15-digit numbers.

ENIAC has 18,000 vacuum tubes. It was built for the Army Ordnance Department at the Moore School, University of Pennsylvania. On its first big problem ENIAC took two weeks to do 100 man-years of trained computers' work. It is a new tool that greatly extends the scope of research—and of the human brain. (SI, May, p. 70)

Press Association





A. U. Schmidt

FLYING WING

As fantastic as anything in science fiction, where it has long been a favorite dream, is the bat-like Flying Wing, a plane without a tail or rudders or cockpit. Small models were secretly tested during the war, but Northrop's great XB-35 was unveiled in June of this year and ushers in

vast new possibilities in military aviation, and in the transportation of passengers and freight by air.

The Wing's great advantage is the reduction of air drag that enables it to carry some 25 percent additional load for the same power. In spite of its awkward appearance it operates exactly like a conventional plane. The Army Air Forces have ordered 15 of these huge futuristic air craft. (SI, May, p. 88; Oct., p. 33)

BIOLOGICAL WARFARE

This development was obscured by the atomic bomb but may turn out to be of equal military significance. Most spectacular result of the Army's biological-warfare studies was the crystallization of botulism toxin. Produced by a bacterium, the toxin is so powerful that infinitesimal

amounts, easily scattered by planes, will cause death in man and animals.

In contrast to the atomic bomb, bacterial toxins can be produced without elaborate installations. Since any nation that has breweries could convert them into bacterial-toxin factories, the apparent monopoly that the United States holds over atomic warfare does not exist in this field. (SI, Oct., p. 25)

International





Press Association

N.A.C.A.

RAM JET

The climax in jet propulsion is reached in the ram jet, the simplest possible engine, with no moving parts. Essentially, it is an open tube in which the flame, roaring

out the rear end, thrusts the tube forward. Air for combustion enters at the front, and is highly compressed by velocity alone; so the ram jet must be launched from a plane, or a rocket, at about 400 miles per hour. In Navy experiments the ram jet has done as high as 1,500 miles per hour. (SI, Oct., p. 62)

CANCER RESEARCH

Russian scientists, at work below, have produced a promising new serum. (Page 32)

Sovfoto

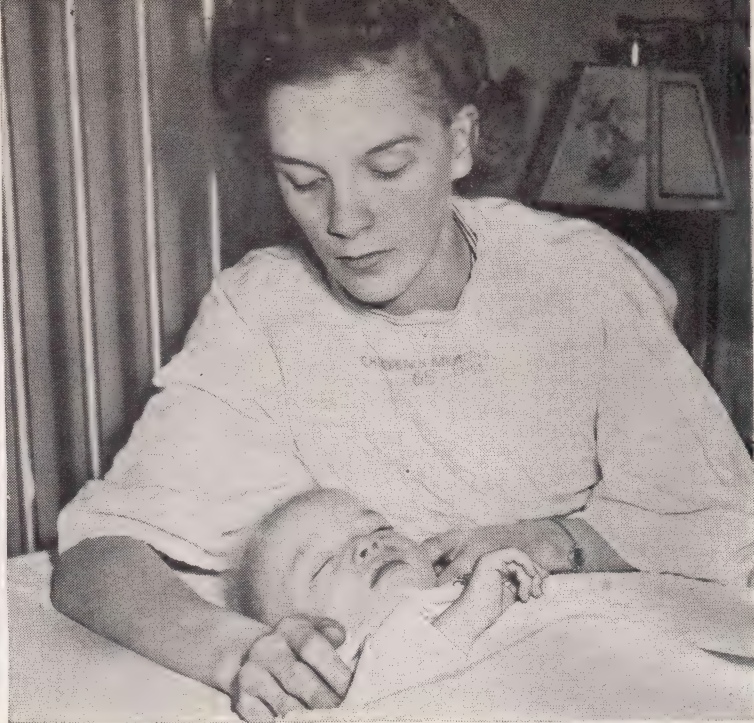




International

INSECTICIDES

New insect killers reached the market in 1946. DDT, so effective in wartime service to the armed forces, became widely available to civilians. Benzene hexachloride, or 666, which is capable of killing the DDT-resistant boll weevil, is also in production. Large-scale use of such new chemicals has already yielded a large increase in beef and agricultural production. (SI, Aug., p. 22)



International

STREPTOMYCIN

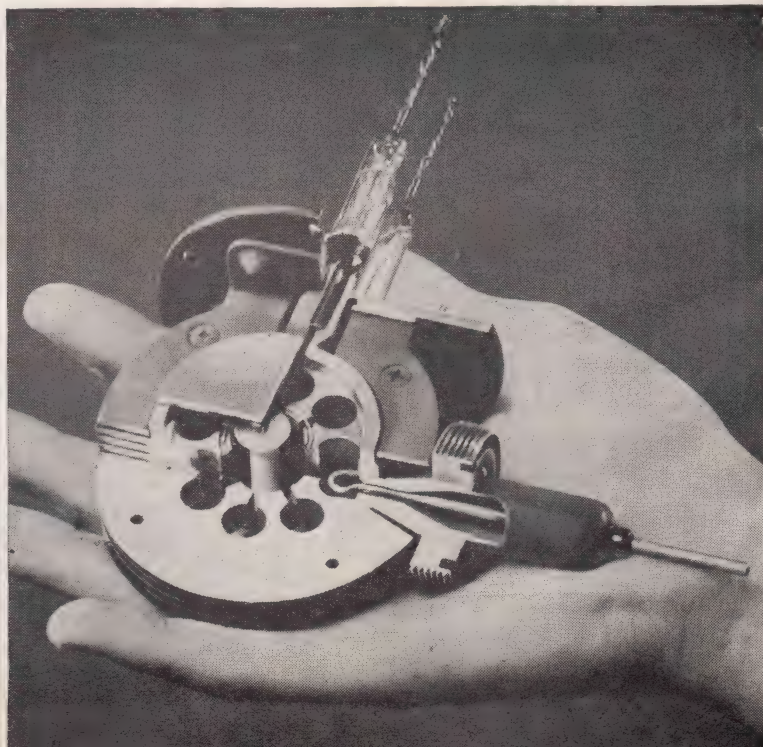
This anti-bacterial drug became available this year in limited quantities. As a result, it was possible to carry out a test program to study its value in treating disease. Streptomycin is effective against tularemia (rabbit fever) and urinary-tract infections. Used with conventional treatments, it may help to control tuberculosis. Some bacteria are becoming resistant to streptomycin. (SI, July, p. 83)

EKTACHROME

Another great step in color photography was announced this year by the Eastman Kodak Company, though developed before the war. With the Ektachrome process, any photographer can take excellent color pictures in any good camera, and can develop them himself in 90 minutes. The long wait for factory-development of films is avoided. Color photography will become much more popular. (SI, Dec., pp. 56, 74)

MAGNETRON

This tube is the pulsing heart of radar. It permits the emission of tremendously powerful electromagnetic waves in bursts that can be accurately timed within a small fraction of a millionth of a second. Radar, essentially, is the interpretation of these waves when reflected back to equipment after hitting an object in their path. The essential function of the magnetron was revealed this year.





Press Association

SNOOPERSCOPE

The human eye cannot see all the light waves in the air. Even at night all objects give off and reflect a large amount of light that is invisible because it is too dark-red, or infrared. The Snooperscope includes a lamp that sends out infrared rays. These are reflected by objects, caught in the eyepiece, and there become visible. This gives night eyes to soldiers, police, and others. (SI, July, p. 111)

MIDGET RADIO

Radio reception—and, therefore, sending and programming, too—has great new possibilities due to the large-scale production of radio tubes less than 4/10 inch in diameter and 1½ inches in length. They have made possible 5-tube vest-pocket super-heterodyne radios for private reception of programs anywhere, camera-size radio telephones, and better hearing aids. (SI, June, p. 108)

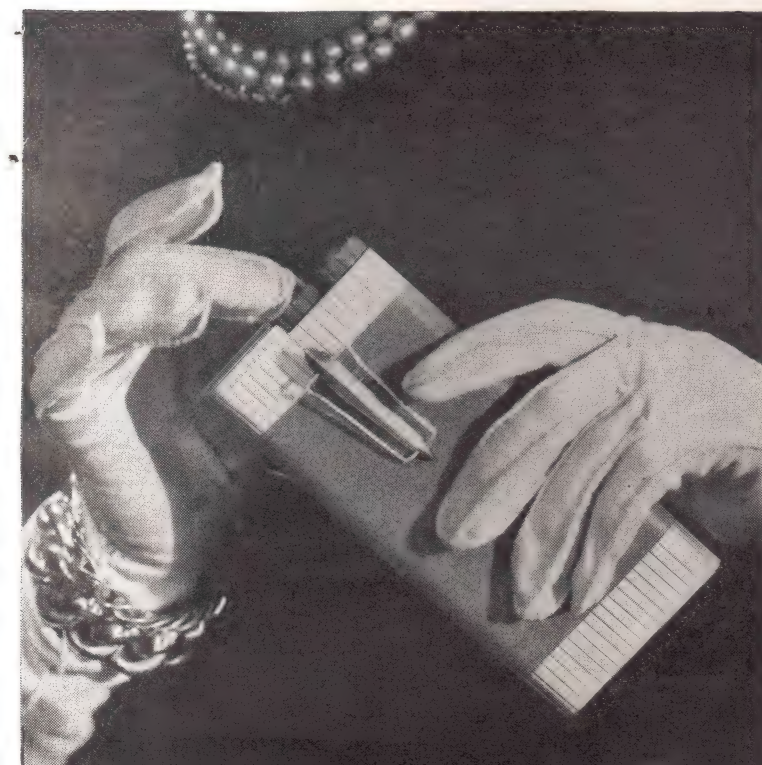


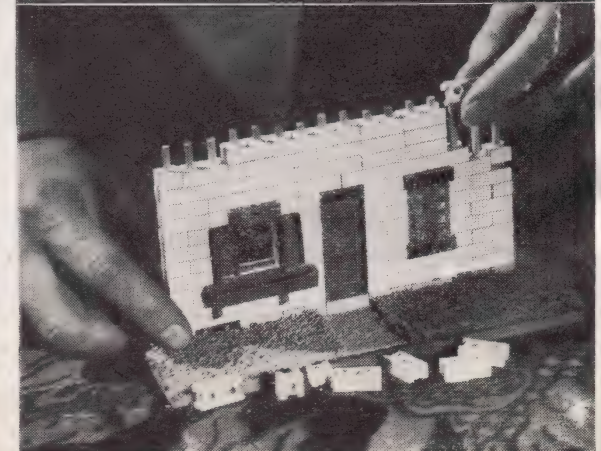
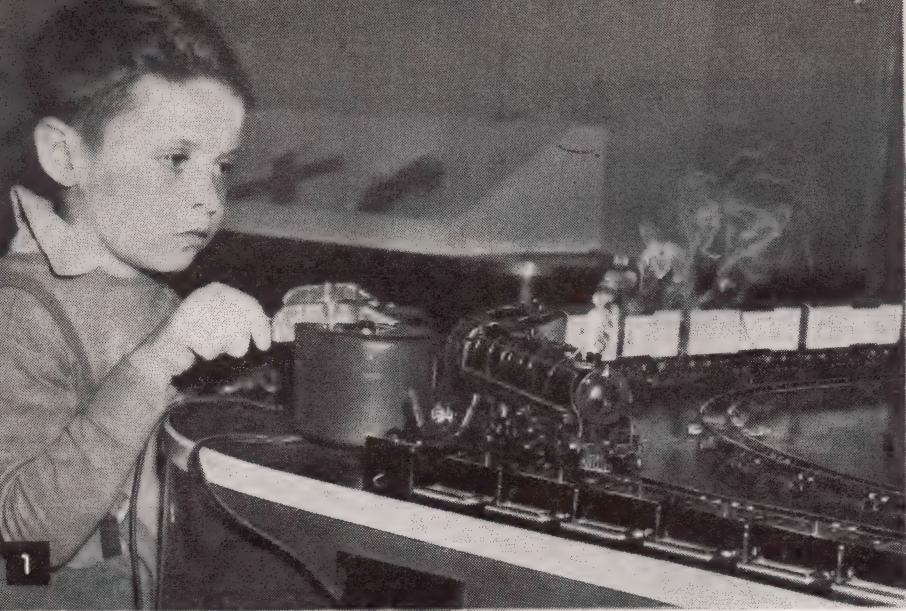
HELICOPTER

It is now a favorite in the newsreels and always on hand for spectacular rescues. But it is already a utility machine, useful in many an industry, pleasure jaunt, and on the farm. Bell Aircraft and Sikorsky are now taking orders for them. They seem more human than the planes depending on speed for their lift. Their popularity may soon present new problems of air-traffic control. (SI, Apr., p. 93; Sept., p. 48)

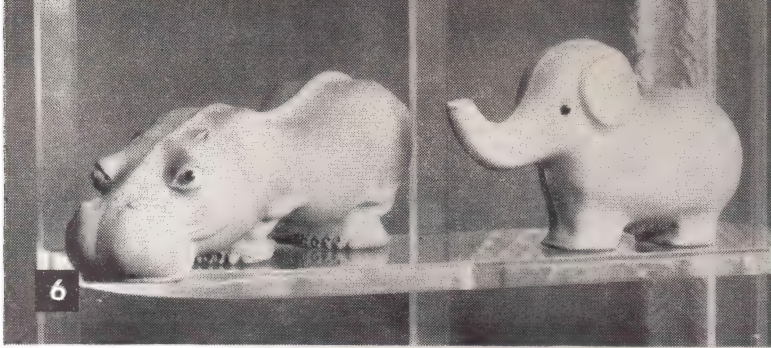
WEED KILLERS

They were developed by the Army's biological-warfare project. Actually, the new products are plant growth hormones. For some time it has been known that minute amounts of these hormones, 2,4-D for example, will stimulate growth, while larger doses kill plants. The new research developed products that, sprayed in relatively large doses, will kill off weeds, as shown below. (SI, July, p. 81)





Science in TOYLAND



AFTER five years of ersatz, Christmas toys and games are catching up with the world of science. The words "electronic," "radar-equipped," and "jet-propelled," preceding such old favorites as trains, planes, and cars, will bring a gleam even to parental eyes. But five million new customers were born during war years, so quantity of toys will still lag behind demand. Attractions listed here are for early shoppers.

1. REMOTE-CONTROLLED TRAIN has a lusty "choo-choo" and belches real smoke (developed from chemical compound, so it won't smudge up the house). Plastic cars travel on realistic new two-rail tracks. *A. C. Gilbert Co., New Haven, Conn.*

2. DURALUMIN BIKE can be one-armed by a boy because it weighs only 13 lbs. To curb speed demons, tension of rubber-fabric belt can be adjusted to act as a "governor." Semipneumatic, punctureproof tires. *George Jue Co., Venice, Cal.*

3. PLASTIC-ALUMINUM HELICOPTER can rise more than 100 feet, circle, or fly forward. Always lands right side up. Wire rotor band acts as flywheel to store up power after it is set to spinning, like a top. *Howard Crawford Co., Detroit.*

4. ELECTRONIC DOLL dances to radio or "live" music. Unconnected to music's source, she converts sound waves into mechanical motion through electronic equipment housed inside the bass drum. *Radio Frequency Laboratories, Inc., Boonton, N. J.*

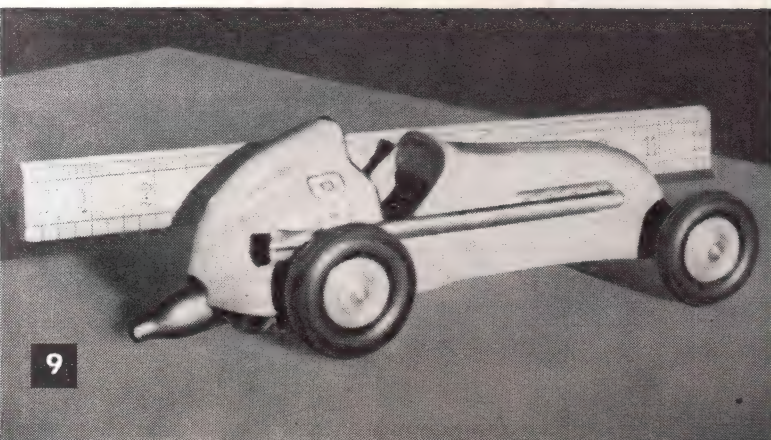
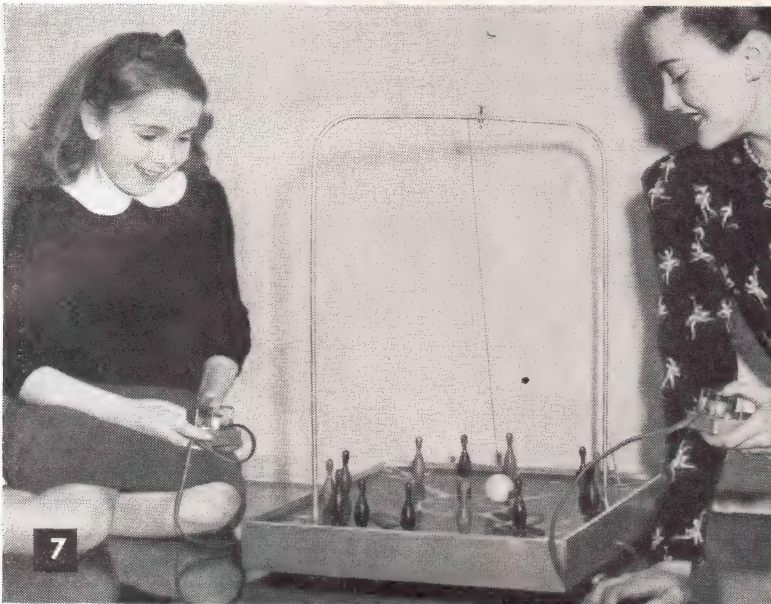
5. VINYLITE BUILDING SET has family appeal. To make anything from a garage to a two-story house with porches, simply fit wood sticks into perforated baseboard, slip tiny bricks over sticks, add a roof. *DuPage Plastic Co., Chicago.*

6. BABY TOYS OF NEOPRENE, man-made rubber that survives exposure to after-bath oil and the ordeal of frequent sterilization by boiling. Colors are mixed into the material, so it is lick-proof. *Molded Latex Products, Paterson, N. J.*

7. BUZZ-BALL TENPINS use magnetic field to influence behavior of ball hanging from wire arm. Object is to knock down pins on board by successively pressing the button that swings the ball. *Electronic Laboratories, Indianapolis.*

8. RADARADIO is like old-time crystal set. It uses no batteries, tubes, or electricity; when attached to any aerial or ground, it picks up stations within a 20-mile radius. Single earphone for bedtime. *Precision Specialties Inc., Los Angeles.*

9. JET-PROPELLED RACER has die-cast body and removable tires. You power it by fastening a soda-water cartridge under axle and sticking a pin in the lead-sealed end to allow pressurized gas to escape. *Cox Mfg. Co., Santa Ana, Cal.*





NEW DESIGNS for Living

Your comfort and pleasure, product convenience and cost greatly concern maustrial designer Dreyfuss

By WILLIAM E. TAYLOR

HENRY DREYFUSS shows a new window of plastic, designed to save weight in 204-passenger plane pictured in the drawing.

WEIGHT-**SAVING**, which already is having a marked effect on the design of our equipment for easier, more comfortable living, is the next American fetish. So believes Henry Dreyfuss, who at 42 is rounding out 18 years as a topflight industrial designer.

"All of a sudden everyone wants to make things lighter," said Dreyfuss, as he relaxed in his New York office for a few minutes of a day packed with consultations on designs for ocean liners, airliners, railroad trains, and vacuum cleaners. "People used to jump on suitcases to make sure they were strong; now they don't want them if they can't be lifted with a finger.

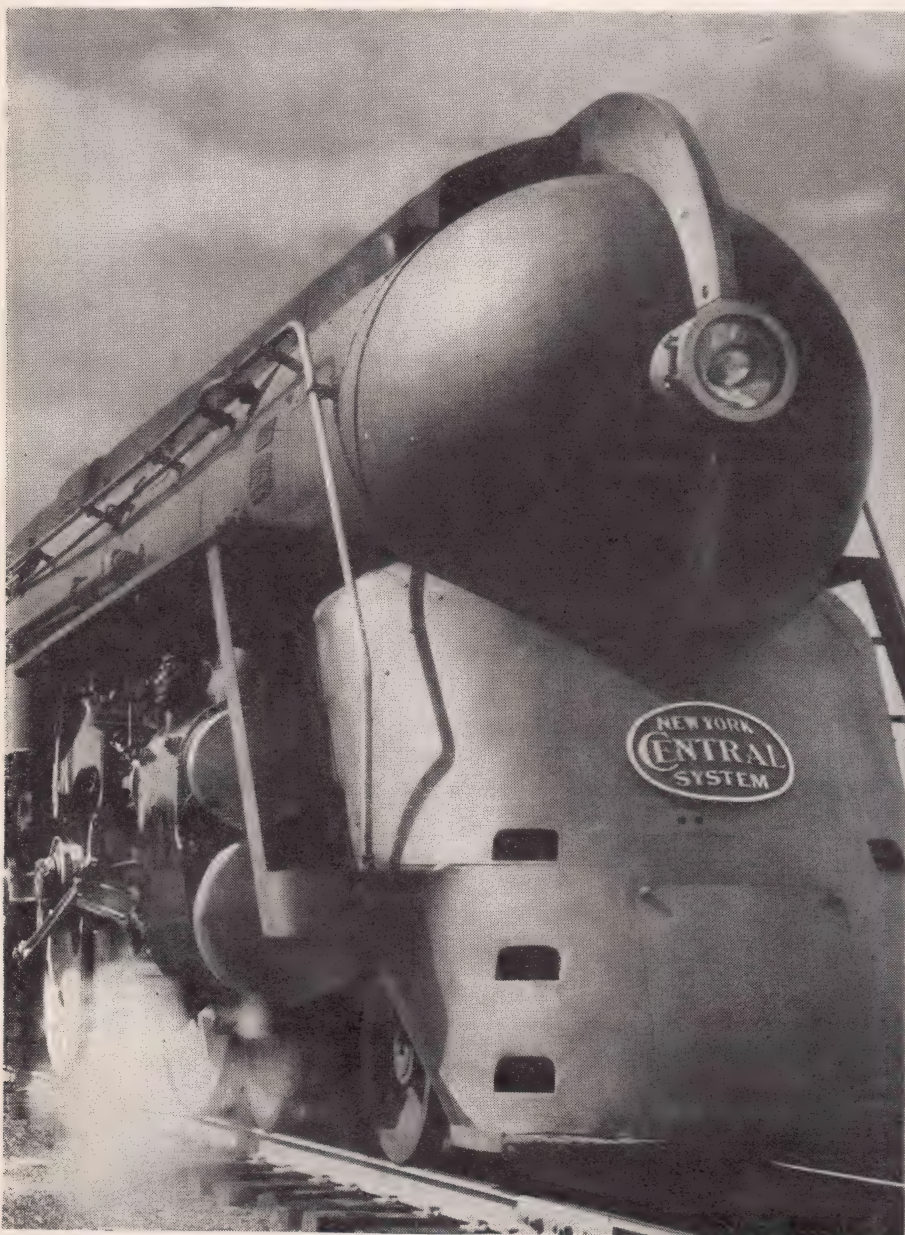
"We have lightweight china for the airlines, why not for everyone? Why should a stack of dinner plates be so heavy a housewife can barely lift it? Heavy knives and forks saddled on us by the past have no justification today. Magnesium utensils can do the job as well with far less effort."

Polaroid plastic windows

The designer stepped from his desk to display a round pane of colored material developed for windows of the 204-passenger Consolidated Vultee airliner. Broad-shouldered, blue-eyed, his brown hair slightly graying at the temples, he moved with a speed in contrast to his usual deliberation of manner.

"It's Polaroid, of plastic instead of glass, and considerably lighter than glass," he explained. "There is a real reason for weight reduction in transportation, of course. And individual controls for each window let the passenger cut out annoying glare without curtailing the light from outside."

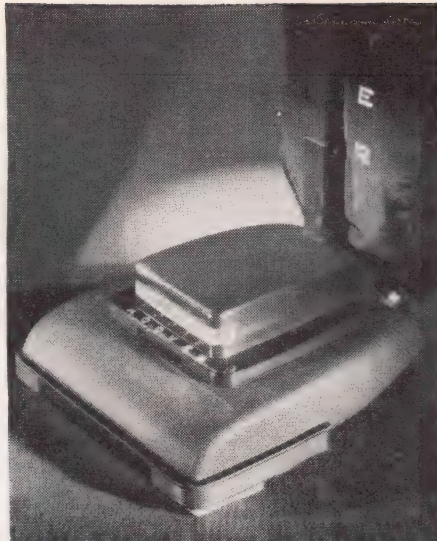
Greater emphasis on weight-saving in consumer goods is reflected today in the increased application of synthetics and plastics, lighter metals and alloys. Use of new materials often must be initiated by the industrial designer, whose credo, according to Mr. Dreyfuss, is simply: "To find precisely the



A DREAM CAME TRUE when Dreyfuss designed the Twentieth Century Limited for the New York Central System. The day he opened his office he and his secretary decided they should have an outstanding goal to work for, and picked the Century. So they got the job.



BEFORE DREYFUSS this was the appearance of the Hoover vacuum cleaner. Designer calls the redesign a typical job.



AFTER DREYFUSS the cleaner looked like this, a smart tool for a utilitarian task. Use of magnesium cut weight of the cleaner.



WING SEATS for airliner and other carriers have individual reading lights, loudspeakers for listening to radio in privacy.

right form for a manufactured article."

That quest for the right form since 1929 has deeply altered the appearance of many of the everyday items found in the American home, as well as to make their use easier and simpler.

"Streamline," says Dreyfuss, "should be cleanline," when applied to much of industrial designing. He points out that streamlining actually means something when applied to planes and other means of speedy transportation: "for instance, there isn't an unnecessary line in a plane." But "cleanline" better describes what the industrial designer tries to do with products that haven't the faintest connection with speed through space.

A great believer in diversification, Dreyfuss contends that the industrial designer should work a few hours on a television cabinet, a few hours on an ocean liner, and a few hours on a camera, or through a list of similarly unconnected subjects, because in so doing he brings a stimulating outside point of view to each product. "The designer can't be confined to one subject if he is to provide the fresh slant management is seeking."

His work in your home

From nursery furniture to bathroom fixtures, from rubber door mats to refrigerators, stoves, toasters, and the hand-set telephone, Dreyfuss has already made his influence felt in American home life.

In his designs for new transportation equipment—train, plane, and bus—Dreyfuss is concentrating on comfort and entertainment for the passenger. "Good individual reading lights, indirect soft lighting, and comfortable chairs are musts in transportation

today," says the designer. "There is no reason why commuter trains should not be like club cars."

Coaches designed for the New York Central System have wider windows for better views, and loudspeakers to make station calling easier on both passengers and trainmen. In addition, Dreyfuss selected reproductions of old masters and modern art as part of the decorative scheme for each car.

Design for the 204-passenger airliner includes use of spun glass for the comforters of the berths, and for the upholstery; another reflection of the weight-saving trend. New chairs developed for the berths face in the same direction, the backs sliding down to form a section of the berth. Use of the chairs in sleeper travel would end the need for riding backward.

For the American Export Lines, the Dreyfuss staff is designing three ocean

liners whose staterooms will be along the lines of the "typical bedrooms" created by Dreyfuss for the Statler Hotel in Washington.

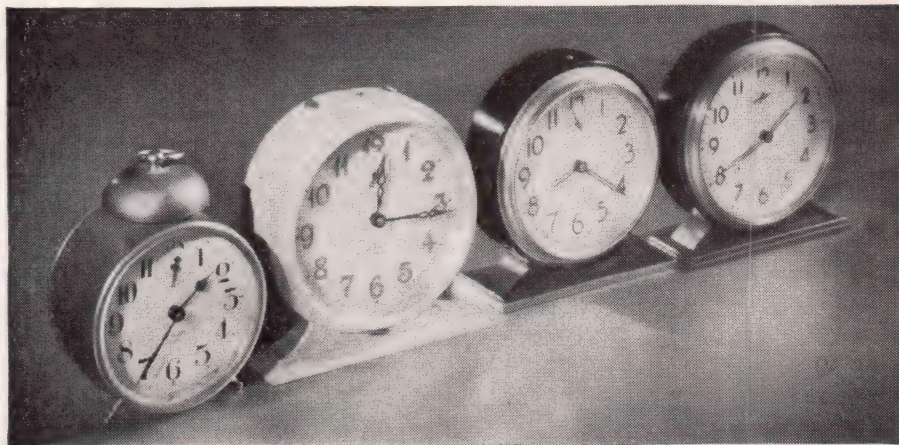
Dreyfuss recalls that the telephone hand set, which he designed in collaboration with the Bell Laboratories, applied weight-reduction principles long before the current vogue for lighter articles. He is credited with putting the light inside the home refrigerator, and the motor unit at the bottom to eliminate stooping.

"Design entered by back door"

Many an American gets up and goes to bed by a smart and functional Big Ben, designed by Dreyfuss. He stood alongside clock counters in stores to note the customers' comments about the old Big Ben and the way they handled that product.

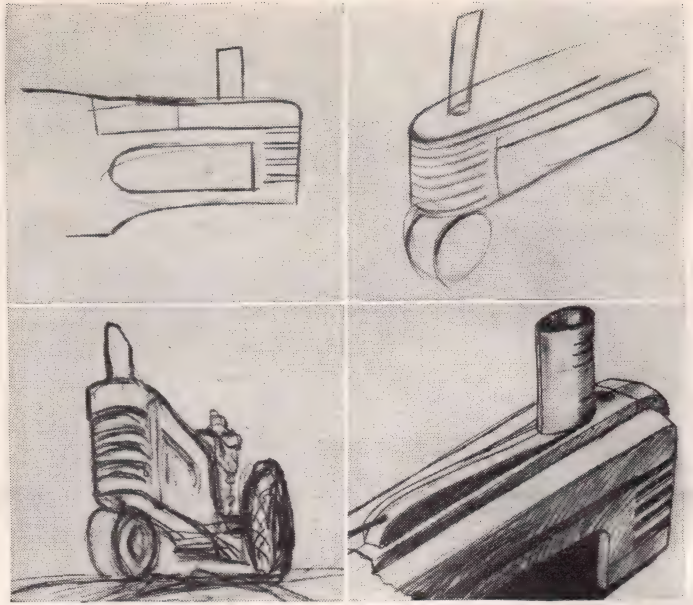
Although Dreyfuss has done some

FAMILIAR FACE before and after lifting by designer's staff. Steps in Big Ben's transition included removal of the bell to the interior, a decrease in thickness of the clock, addition of its pedestal base, and a vast improvement in the readability of numerals.

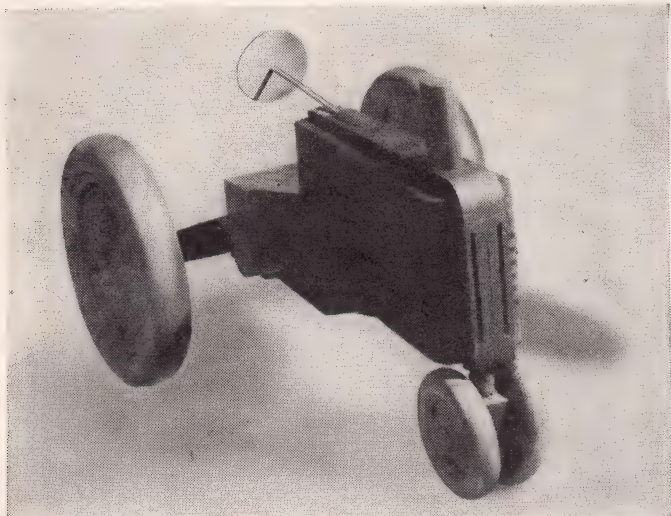




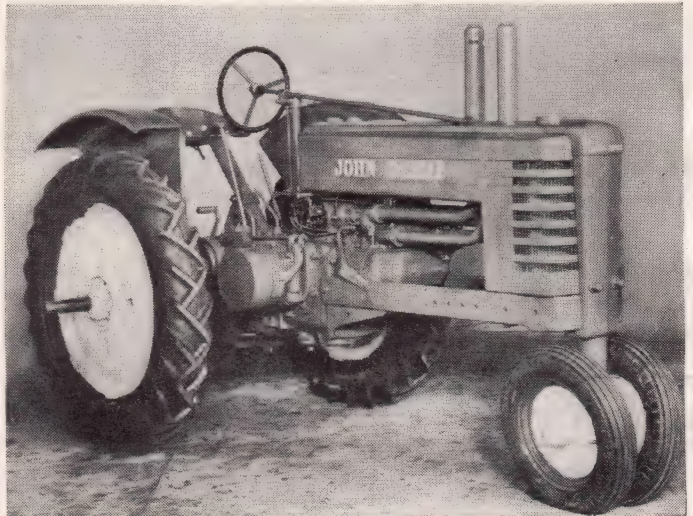
IN NEED OF REDESIGN was this tractor made by the John Deere Co. Designer Dreyfuss learned to operate one of the haulers so he would have first-hand knowledge of changes that should be made.



REDESIGN BEGINS with the preliminary sketch at upper left, and proceeds through various stages on the drawing board as pictured from left to right. This is only part of the paper work.



MODEL IN WOOD AND CLAY is one step beyond the drawing board. This model carries out only the basic lines of new design, but they are of extreme importance to the manufacturer's product.



FULL-SCALE WOOD MODEL of tractor is the next step. It permits making minor revisions in design without delays due to alteration in a metal model, the last phase before production.

of his most striking work in the field of transportation, including design of the Twentieth Century Limited, he is fond of developing mass-production articles, and wishes the public were a little more informed about them. Says he:

"Design entered through the back door. Good design was first accepted in the kitchen, bathroom, and laundry; and in the majority of American homes, these still are the best-designed rooms."

Dreyfuss regards color as one of the most important things a designer has at his command. He emphasizes that color must be fitting, however; that some things should be unobtrusive, and others eye-catching.

Many of the Dreyfuss projects have been on a grand scale. He designed the interior of the Perisphere at the New York World's Fair, and the Strategy Rooms, Washington, for the wartime chiefs of staff. He was a theatrical designer before entering the industrial field in 1929. And he might have continued after 1924 to teach art at a New York school had not one of his pupils bitten him.



NEW TRACTOR as it went into the fields, a success from the start. Industrial design gave it easier operation and maintenance, and decreased the hazards found in the earlier equipment.

COOKING with RADAR

Heat is all inside food,
created by molecular friction

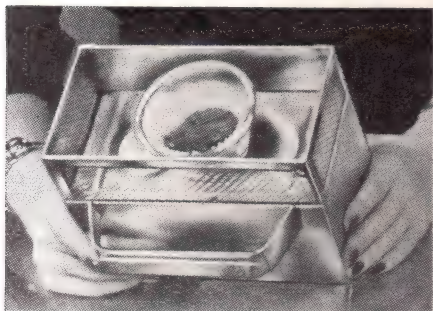
RADAR comes down to earth and into the kitchen in the new electronic range that has for its source of energy the magnetron tube, the heart of radar. Super-high frequencies are concentrated through an ovenlike horn upon the food to be cooked. They will grill a frankfurter on roll in eight to ten seconds, cook a hamburger and onion in 35 seconds, defrost a pre-cooked airliner meal and heat it to 170 degrees in a minute. Most meats and vegetables can be cooked in two minutes, or frozen foods defrosted in only a few seconds.

The magnetron's energy oscillates at three billion cycles a second. This causes the molecules of the food to rotate 180 degrees in synchronism. Resulting friction generates the heat inside the food; containers stay cold.

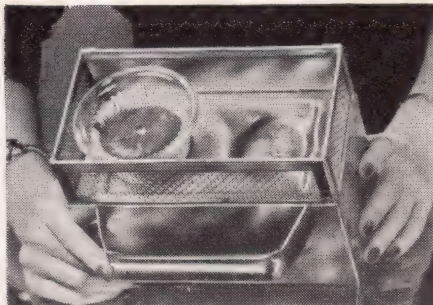
Commercial Radaranges are going into production first, for restaurants and airliners. A home model is due in a year, says Raytheon Mfg. Co.



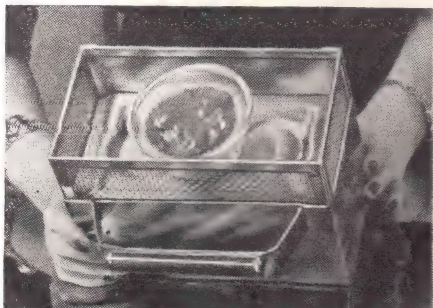
RADARANGE shown above cooks most foods in a few seconds by utilizing the super-high frequencies from a magnetron. Operating cost is 10 cents an hour, maker says.



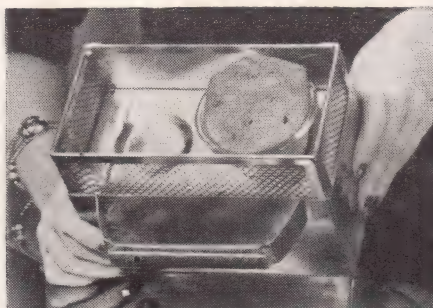
GINGERBREAD BATTER, prepared from ordinary mix, is ready for the Radarange.



5 SECONDS: Batter has already started to rise under energy from the magnetron.



10 SECONDS: Gingerbread is well under way, but basket stays cold to the touch.

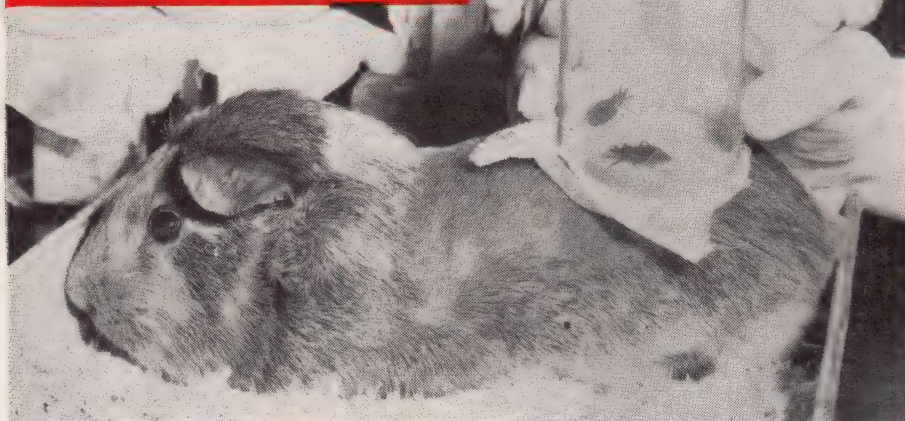


15 SECONDS: Cake is now almost full, cooked size. Rays do not create a crust.



29 SECONDS: Ready to eat. The gingerbread is thoroughly done. It's light and hot, too.

SCIENCE ILLUSTRATED EXCLUSIVE



National Institute of Health

INFECTED GUINEA PIG carrying the deadly parasites of Chagas' disease in its blood transmits them to the blood-sucking insects shown under glass. Blood taken from infected guinea pigs is a source of the new Russian KR serum that attacks the cells of cancer.

KR—New Russian Advance in Cancer Research

By BARRY COMMONER

MATCHING cancer's own disregard of international boundaries, the latest promise in the search for a cure comes from a Russian laboratory working with a South American parasite supplied by a British scientist.

The Russian researchers, Dr. Gregory I. Roskin and his wife, Dr. Nina Georgiyevna Kluyeva, have produced KR, a serum that kills cancerous cells. Although KR has been close to 90 percent successful against laboratory-produced cancers in 13,000 mice, it has been used on few humans. Since cancer patients must be watched for years to determine whether a halted growth revives, the new serum cannot now be called a cancer cure.

"The child is promising"

In an exclusive interview with *SCIENCE ILLUSTRATED*, the discoverers themselves warned against over-optimism:

"The remedy is our child (and accordingly initialed) and like all parents we think the child is extremely promising, but it is a child, and only time and hard work will show whether it fulfills its promise. We tried the remedy on 60 patients, half men and half women. Of them we had eight com-

plete successes, with the cancer disappearing entirely; in 10 the growths were arrested and even diminished; we failed in curing the rest, but we must point out that all cases were so grave that other remedies would have failed. Only recently we began experimenting with less grave cases."

Dr. Roskin began his cancer research 25 years ago. He knew, as other researchers knew, that, unlike infectious diseases, cancer is difficult to control because it is in a sense a part of the body itself. It starts from healthy cells that begin to multiply rapidly and then invade and disrupt the body organs. The key to the cancer problem, therefore, lay in finding some distinctive differences between cancerous and normal cells. Dr. Roskin reasoned:

"There may be such characteristics that, figuratively speaking, become the 'weak points' of cancer cells and consequently suitable to be used in the struggle against malignant tumors."

Searching for this Achilles' heel, the researcher decided to try attacking cancer cells with various toxic diseases. He hoped that one might prove more deadly to the cancer than to healthy cells. Earlier American research had shown that certain bacterial diseases

had effect on cancer, but the diseases themselves were often so toxic that they also damaged healthy cells in the victim's body.

Looking for a more precise weapon, Dr. Roskin, by a brilliant stroke of insight, chose an obscure South American ailment, Chagas' disease.

He did so because the disease he was looking for had to concentrate in special parts of the body, rather than cause an acute general infection; it had to invade the cells themselves, not merely the body fluids. And Chagas' disease, alone among all known ailments, seemed to fit these specifications.

Deadly parasite is selected

Chagas' disease is spread by *Triatoma*, a blood-sucking insect related to the bedbug, infected with *Trypanosoma Cruzi*, a parasite similar to the one that causes African sleeping sickness. Through the wound left by *Triatoma*'s bite, parasites in the insect's feces enter the victim's bloodstream, and invade from there the body cells themselves.

Growing inside the cells, the parasites finally kill them and burst out to infect neighboring healthy cells. Most significant for Dr. Roskin's search for a weapon against cancer, the trypanosomes seem to be drawn toward special tissues; they usually concentrate in heart, connective, nerve, and glandular tissue.

In his first experiments, Dr. Roskin grafted cancers into 45 mice and then infected them with *Trypanosoma Cruzi*. Ordinarily, such grafts grow rapidly until they kill the mice. With the parasitic infection added, this did not happen.

In 15 mice the cancers did not enlarge, and in 30 they actually became smaller. True, all of the mice in time died of the infection, but they lived longer than cancer-bearing animals not so infected.

Roskin tries his first serum

Using the microscope, Dr. Roskin saw the trypanosome inside normal and cancerous cells, but more concentrated in the latter. The infected cells seemed to wither away.

Now the problem was to keep the trypanosome from killing the cancer victim. Suspecting that the cell-dissolving power came from some substance that could be extracted from the parasite itself, Roskin prepared a serum from the blood of trypanosome-infected guinea pigs. This serum he injected into 43 cancer-bearing mice. And these he watched in comparison with 17 cancerous mice that received no serum, (Continued on page 87)



● ● EASTER PARADE on ice is glamorized by lighting — purple from front of house, green from backstage.

LIGHTING the Icecapades

It takes a rare combination of technical knowledge and skill to light-paint this swirling, multicolored show

LIGHT of every color of the rainbow—not to mention white and “black”—lends its magic to the dazzling optical effects of the Icecapades, nationally famous skating show. In the course of the two-hour performance, light director Gibbs calls some 300 cues. His staff of 20 men handles 12 spotlights, 40 overhead Klieg lights, and a three-sided, 325-foot “kick-board”—the equivalent of conventional stage footlights.

Perhaps the most striking effect is achieved by ultraviolet (“black”) light, under which fluorescent costumes glow with color while the rest of the scene is blacked out. Almost as spectacular are changes produced by gelatins of different colors on the spots and Kliegs. Pictures on these pages, posed by members of the cast and photographed under various colors, show why this technique is spreading rapidly to window display and related fields.



“BLACK,” or ultraviolet, light gives a disembodied effect to costumes treated with fluorescent colors. Teeth, nails, and eyeballs glow; colors have peacock brilliance. Photo was made in total darkness.



WHITE light makes the same costumes and wearers look like this. Since white light contains all colors, each shade now has its natural value, reflecting its own hue and absorbing all the other wave lengths.



DISKS represent lights as Icecapades boss Harris and lighting engineer Gibbs plot a colorful scene.



DURING PERFORMANCE, Gibbs watches the show from the balcony, cues his 20-man crew by phone.



NEW SPOTLIGHT is one of ten 2,000-watt high-intensity lamps that are placed around Icecapades arena.



PORTABLE SWITCHBOARD contains system of rheostats. Operator changes lighting on cue from Gibbs.



PAINTING WITH LIGHT is seen at its best on the opposite page. Cross-lighting of pink, green, and amber produces a soft, natural effect. Just enough green comes from the lower right to pick up the trimming on hat and costume. Dark pink from overhead is accentuated by a cross light of amber, the combination imparting a warm and flattering glow to the tones of the skin.

Photographs by Allan Gould



GREEN light blacks out colors that have no green in them. Flounces and girls' lips go completely black; everything else, including skin, is green. The eerie effect shows how mood is created with light.



AMBER light turns white skirts, pattern and all, to yellow; brightens red flounces; lightens bodices; makes girls' skins glow. All these elements have yellow in them and so reflect yellow light.



DARK PINK adds orange to red tones of make-up and flounces; peach bodices remain unchanged; skirts reflect dark pink; pattern retains its yellow.





Designed by John Weber

PLASTICS BODY. Top drawing shows panels of plastics fused in aluminum frame of station wagon, ideal test car for the material.

WHEEL PANEL. With all instruments under the driver's eye, the usual dashboard can be replaced by storage space or crash padding.

DESIGNED TO IMPROVE YOUR NEXT NEW CAR

CAR owners may see the day when fenders will never be dented, scratches will be removed by buffing, and broken body areas will be replaced easily and cheaply. That's the way it will be if John Weber's design for a plastics station-wagon body becomes a reality. If the design for a steering-wheel ensemble materializes, our cars will be roomier and safer.

Some designs being put forward to enable the extensive use of plastics as functional material for cars envision car bodies in one piece or several large, complex pieces. Weber's design features relatively small plastics panels integrally bonded to a metal frame.

Reinforced plastics embody high impact strengths, but

in violent collision they will rupture. In this design a damaged panel may be replaced without involving the rest of the body. However, these plastics have considerable flexibility; under lesser impacts the material gives and returns to normal, instead of denting. Scratches may be removed simply by buffing, for the color and surface finish of the material go all the way through.

The lower design shows the space-saving possibilities of a steering wheel containing all instruments in a floated unit (which is pushed to sound the horn) and eliminating the conventional dashboard panel. This assembly makes for added safety, too, because the driver doesn't have to glance aside to see the instruments.

Packaging Air Waves

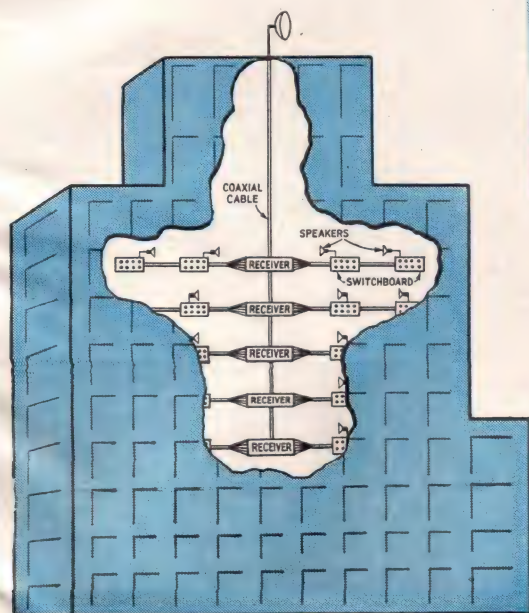
Radio "union station"

broadcasts 8 programs at once

SHEER lack of space in radio's spectrum limits freedom of the ether today, but a revolutionary new system of broadcasting opens an almost unlimited number of new channels for varied forms of communication.

Using Pulse Time Modulation (PTM), a single transmitter, or Grand Central of the Air, can transmit eight or more different programs at once on a single radio frequency. A broadcaster thus needs only studio equipment to set up shop. Similarly, one master receiver can feed satellite receivers with PTM programs to provide complete radio service for an apartment house or office building (see picture below).

The PTM system developed by Federal Telecommunications Laboratories, research unit of International Telephone & Telegraph Corp., utilizes radar principles and the ultra-high frequencies. Fragments of the various programs are gathered in sequence in half-millionth-of-a-second pulses, hurled into the air in radar-like bursts, and unscrambled by the receiver.



DECEMBER, 1946



TICKER-1



TELETYPE-2



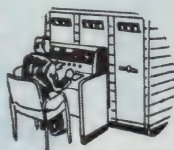
FACSIMILE-3



A NEWS-4



AM BROADCAST-5



FM BROADCAST-6



RECORDINGS-7



MUZAK-8

A
EIGHT
BROADCAST
STUDIOS

H
EIGHT
INCOMING
PROGRAMS



TICKER-1



TELETYPE-2



FACSIMILE-3



NEWS-4



AM BROADCAST-5



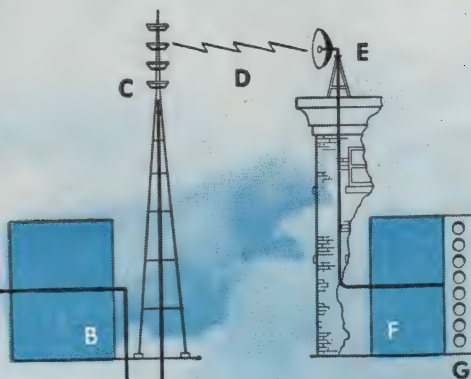
FM BROADCAST-6



RECORDINGS-7



MUZAK-8



A Programs from eight different sources of broadcasting.

B Central transmitter chops eight programs into fragments.

C Antenna sends out the fragments in radar-like bursts.

D Fragments travel in pulses, in fixed order, by microwave.

E Fixed antenna picks up the eight-in-one program signals.

F Multiplex receiver unscrambles pulses in right sequence.

G Each dot represents a push button controlling one program.

H The eight programs as they emerge at the receiving end.

Broadcasting of eight different programs simultaneously by a single radio transmitter, as pictured above, is not so complicated as it might appear. It's all made possible by applying radar techniques to broadcasting, hurling the signals into the air in short bursts or pulses rather than on a continuous wave.

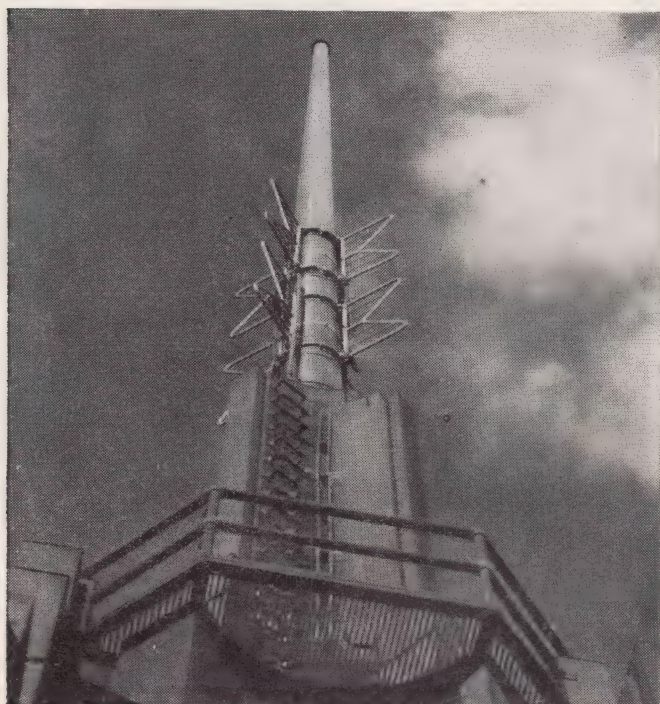
The pulses are only a half-millionth of a second in duration, and this almost incredible speed is the key to the eight-in-one transmission. First, the eight programs to be broadcast are arranged in a predetermined order, as shown in the drawing. A synchronizer or timer picks up a fragment of each program, one after another. Each fragment becomes a single pulse of electrical energy. A series of eight pulses goes through the transmitter and leaves the antenna in one burst. Another synchronizer at the master receiver unscrambles the burst in proper order. This is repeated at such high speed that the human ear cannot detect the breaks between pulses.

SCIENCE GALLERY



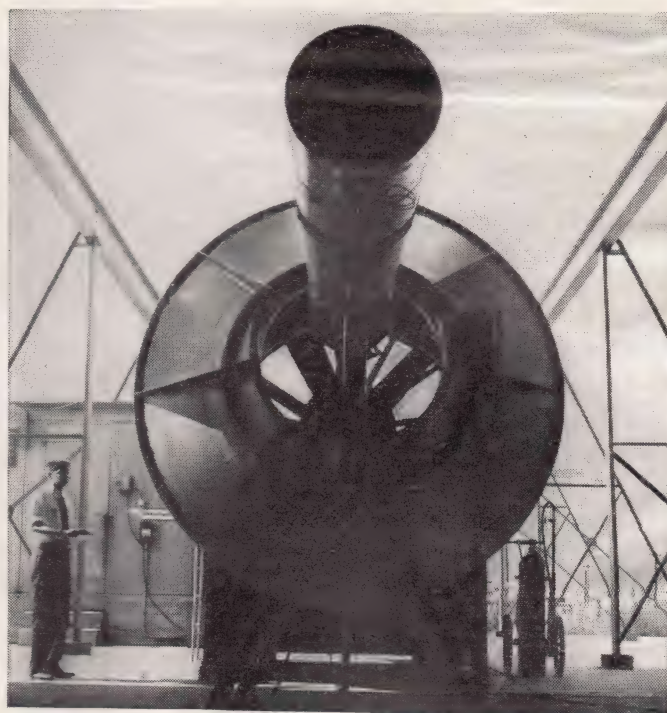
A MILLION MILES without a major overhaul is the performance promised for this 6,000-hp. Diesel-electric locomotive, first to be produced by a full-scale assembly-

line technique. Turbo-supercharged power units can drive the American Locomotive Co.-General Electric giant 120 miles an hour, with smooth starts and stops.

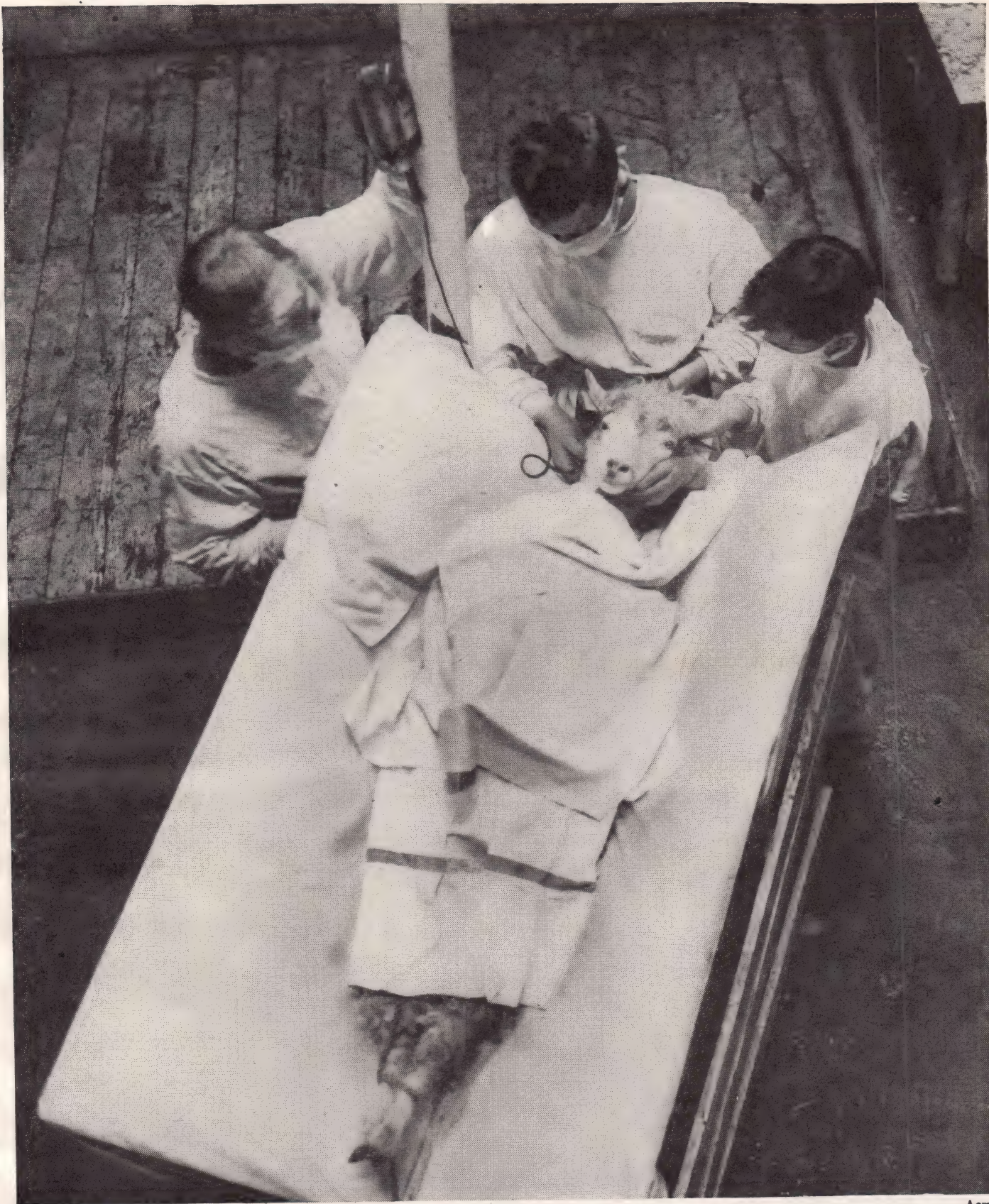


Dispatch News Features

BAT-WING ANTENNA atop the world's third-tallest building, at 70 Pine St., New York City, sends FM programs of radio station WGYN over an area of more than 9,000 square miles. First of its kind, the RCA-designed antenna also can carry television and facsimile broadcasts simultaneously. Heating elements prevent formation of ice that might fall and injure passers-by.



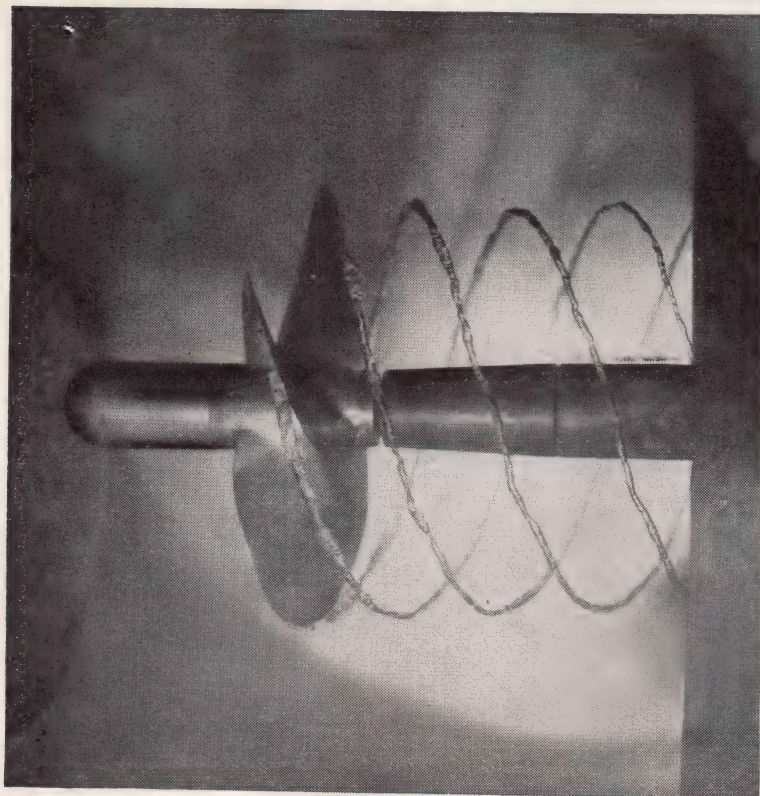
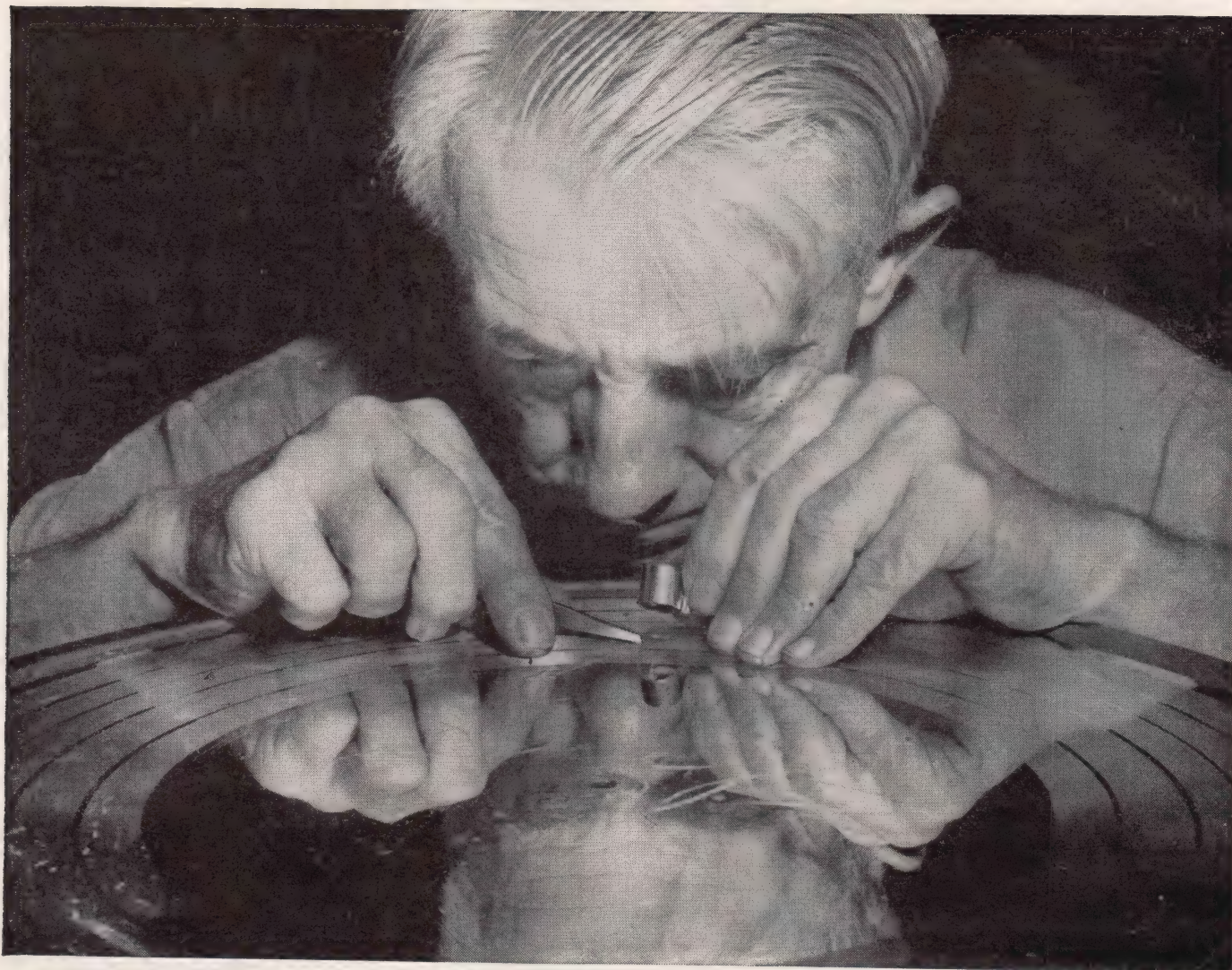
JET WIND TUNNEL simulates supersonic-flight conditions for testing jet and rocket engines. Buzz bombs and rockets of various types roar, spit flame, and tug at their moorings in the blast of air from the open-ended tunnel's fan. The high-speed air flow produced by the tunnel provides proper operating conditions for testing pulse-jet or ram-jet engines.



Acme

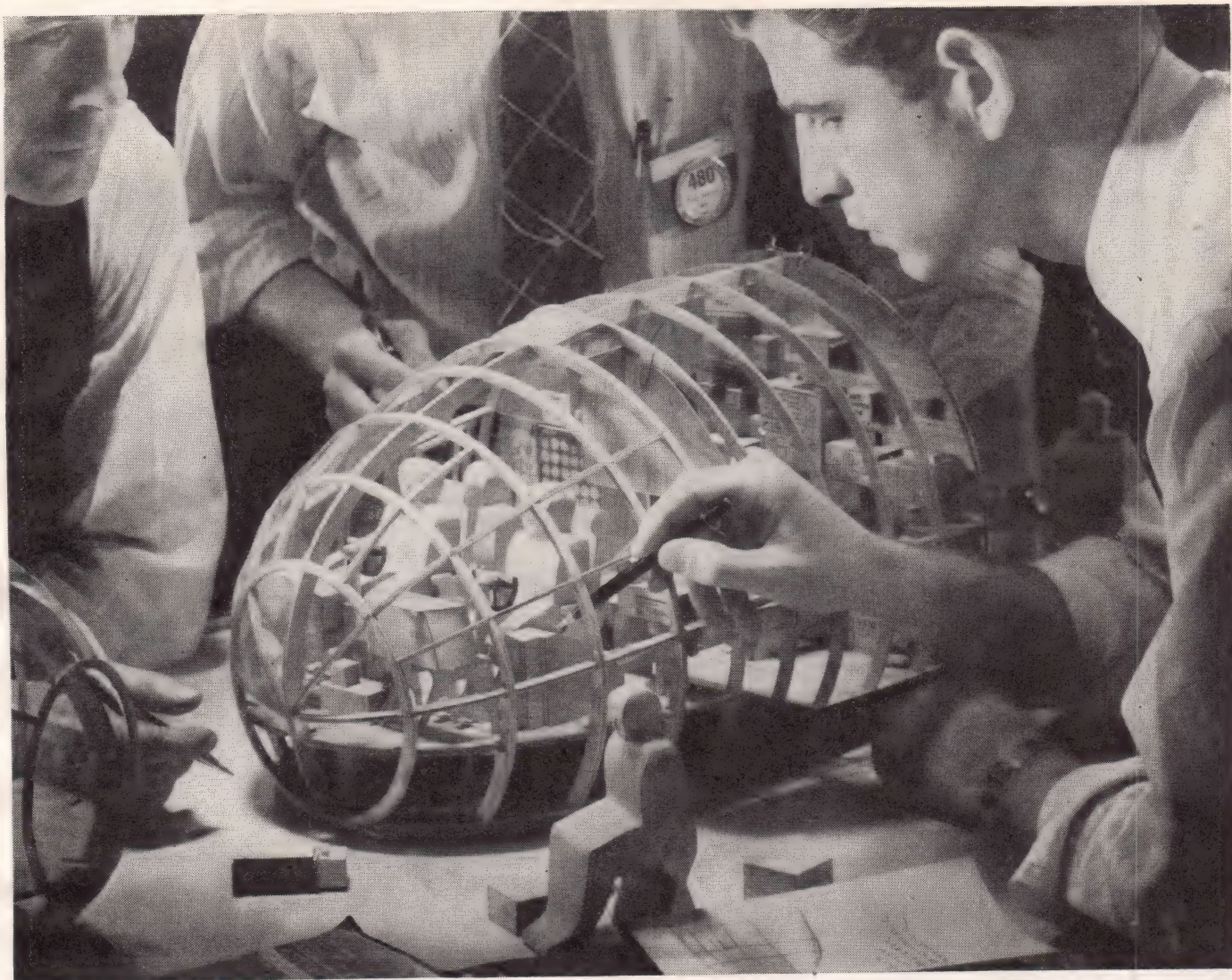
BIKINI VICTIM, a goat suffering from anemia caused by radiation in the atomic-bomb test, gets a blood transfusion aboard the transport *Burleson* at Washington Navy Yard. Known as No. 23, it was one of 176 goats used in the test, in which 35 percent of all the animals exposed to the bombing were killed. Study of No. 23 and other survivors among the goats, pigs, mice, white rats, and guinea pigs

already has given science valuable data on the treatment of radiation sickness. Penicillin, as well as plasma, has proved effective, and No. 23 has had as much attention as any ailing brass hat. Although many of the animals that have been brought back to this country appear so far to be in the best of health, atomic sickness may cause their deaths in coming months.



"MOTHER" RECORD of an electrical transcription gets a careful going-over at the hands of a Columbia Recording Corporation engraver to make sure that no fleck of dust has produced a bubble in the electroplating process. This copper record represents the third stage in the making of the disk that is played by your radio station. From the lacquer recording disk a copper "master" record is made by electroplating. The "mother" record, made from this, gives birth in turn to the "stampers" used in pressing the playing records that go to radio stations. Two stampers in a press resembling a waffle iron squeeze the music into the playing record.

SPIRAL PATTERN in the microflash photograph at the left is formed by "tip vortices" trailing off the blades of a propeller under test in the 12-inch variable-pressure water tunnel at the Navy's David Taylor Model Basin, Carderock, Md. The vortices are produced by cavitation bubbles, empty spaces formed on the forward edges of the blades as they pull against the water. In the picture, the upper blade is moving away from the observer; water is flowing from left to right. Combination of propeller rotation and water flow gives spiral pattern to the vortices.



MINIATURE MOCKUP helps Boeing engineers test various arrangements of crew and equipment in the nose of the Stratocruiser. Inside the wooden model, representing only the upper lobe of the double-deck fuselage, dummy crewmen and instruments can be placed in trial positions. In the picture the copilot, flight engineer, and pilot are at their stations with their instruments in front of them; the radio operator and navigator will go in the next compartment aft. Small mockups of this type are often used in preliminary design studies prior to the construction of full-size mockups. Many of them are made of plastics instead of wood.

Wide World

"FLYING DRAINPIPE" is what Britishers called this odd-looking flying machine when they saw it recently in an aircraft display at Radlett Aerodrome, England. The Cunliffe-Owen W-9, to give it its correct name, is a helicopter that uses the jet principle for directional control and to counteract torque. Exhaust gases from the reciprocating engine that drives the rotor are combined with air from the cooling fan to produce a sideways jet at the tail. By regulating the strength of this jet, the pilot can swing the helicopter's nose in any direction.





IN ALL-WEATHER ROOM men march in man-made downpour to test water-resistance of rain suits. The men rub each other's shoulders to simulate the effect of brush and trees in the field.

Fitting CLOTHES to CLIMATE

DUE to a wartime need, the designing of men's protective clothing jumped from an art to a science. Discarded were the trial-and-error methods of developing garments. Where one group of scientists had been studying man from his skin inward independently of another



ARCTIC ROOM in Army's climatic research lab. Treadmill simulates marching conditions for experiment crewmen. Wearing full marching equipment, including a rifle and camouflage over-white

suit and parka, he maintains standard pace of $2\frac{1}{2}$ miles an hour. Insert shows observer stationed at window outside the cold room taking a report on cold-or-warm sensations from crewman inside.

group that studied his environment from the skin out, now all were united in considering his clothing needs. Among them were specialists in geography and climate, in engineering and biology, in chemistry and insect life.

The new science of clothing is only four years old; and still pretty much the baby of the U. S. Quartermaster Corps, which in 1942 was confronted with the reality of providing battle clothing for a variety of inhospitable climates. Today the Army proposes an Institute of Man. This would keep alive the study of men's clothing needs—not only for the purpose of being better able to protect fighting men against weather casualties, but for applying science to raise the standard of comfort for all Americans.

The photographs on these pages were made at the Lawrence (Massachusetts) Climatic Research Laboratory. They illustrate the ingenuity of testing equipment and the methods for physiological group testing that already have furthered the science of clothing.

First, the scientists had to create tests to learn how the human body reacts to heat, cold, and wetness. Second,

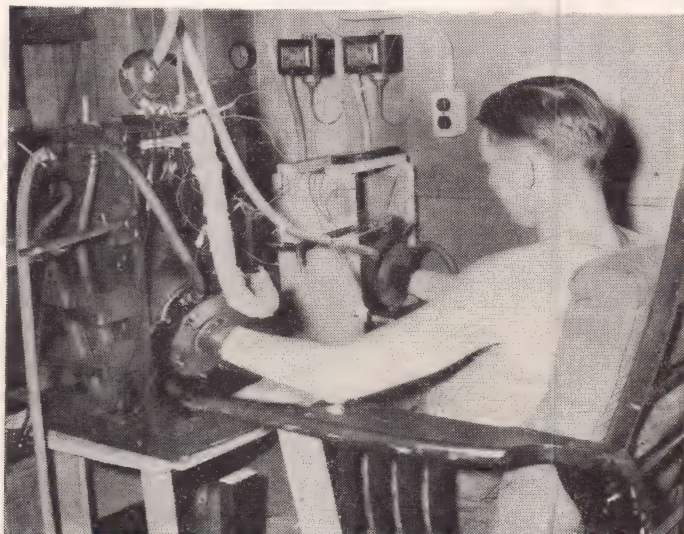
they had to learn the physical principles involved in providing comfort and clothing protection. Third, they had to study, from the human standpoint, the climates of the world. And after that they had to develop new materials and new garments. The researchers say now that before proper clothing protection can be selected, it is imperative that they establish five out of six factors:

(1) The weather. (2) The activity or the heat the body is producing. (3) The length of time the body is to be subjected to a given environment. (4) The degree and efficiency of available clothing. (5) The efficiency of the body in adjusting to any specific weather condition. (6) Whether a man is mentally adjusted to wearing his clothing properly to get the most beneficial results from it.

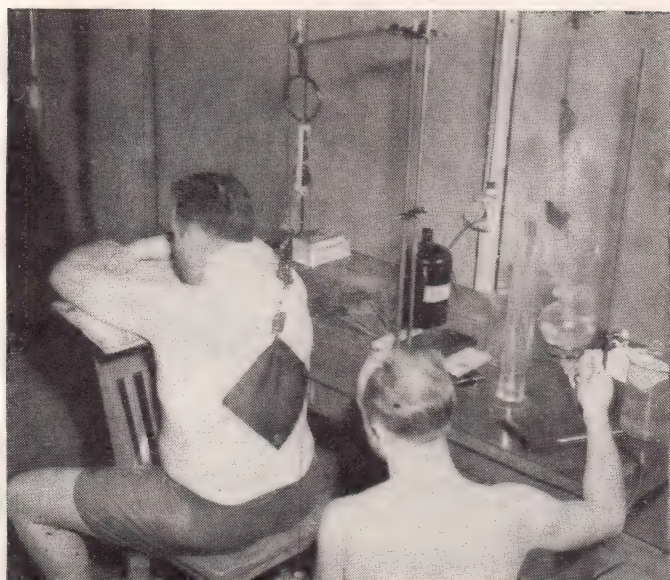
The wartime requirements were so stringent one researcher says, without too much exaggeration, "Clothing had to be infinitely light and infinitely strong, infinitely warm and infinitely cool, and in an emergency it was to be digestible so it could be used for food."



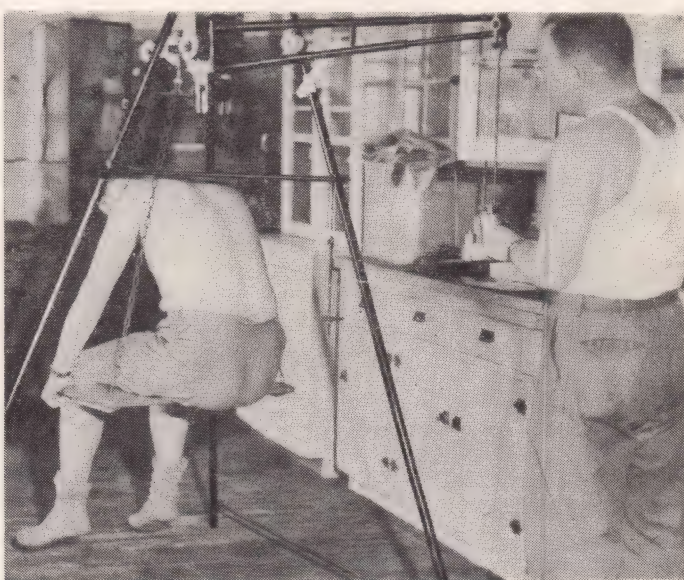
FOOT CALORIMETER measures heat loss from feet under differing conditions. The man's foot is ready to register its cold tolerance inside an Arctic sock and under various test blankets.



HAND CALORIMETER serves in tests of handgear. By measuring first the heat loss of an ungloved hand, and then the loss with a glove on, researchers determine the glove's protective worth.



TROPICS ROOM. In a dragometer test of jungle uniforms, the fabric wet with artificial perspiration is clapped on the man's back. Force required to remove it determines comfort potential.



UNUSUALLY DELICATE, this tripod scale weighs to accuracy within five grams. Test men are weighed carefully to determine body changes due to exertion under various simulated climates.

A Locomotive TRYOUT

A modern Iron Horse demonstrates its capacity on the rails, and thereby aids in designing future motive power

A MODERN high-powered steam locomotive costs upwards of \$250,000. Its life expectancy is about 6,000,000 haulage miles. It should do 275,000 miles without going into the shops for overhaul. It must pull a total of millions of tons of revenue-producing freight at speeds up to 45 miles per hour; or a total of millions of passengers at a high of 85 miles per hour. Its great weight affects, and itself is affected by, the rails and roadbed over which it rolls. And above all it must be reliable and economical in operation.

Those are among the main reasons why a railroad acquiring a locomotive of new design proceeds almost immediately to give it a remarkably thorough tryout.

The New York Central Railroad recently put into service the Niagara locomotive, the largest and most powerful

coal-fired steam hauler ever designed by the NYC Motive Power Department. The big unit's ultimate performance is determined by the exacting rail tests that began after a few weeks of regular service had left working parts well broken in.

Then it entered a shop for test of the boiler and all appliances and for the application of test equipment in both the locomotive and the dynamometer car in which recordings of all rail tests are made.

First of these tests is the one for capacity. In this the train is made up of the Niagara, dynamometer car, a second locomotive (which regulates speed), and 125 cars (or 9,000 tons) for slow-speed operation. In high-speed tests, the Niagara, dynamometer car, and up to 25 passenger coaches make up the train. A typical speed test recently run by the NYC was on the 140 miles of track between Albany, New York, and East Syracuse—where a fast schedule calls for a time of 130 minutes. The train followed an express by 20 minutes in order to get a clear track for the run.

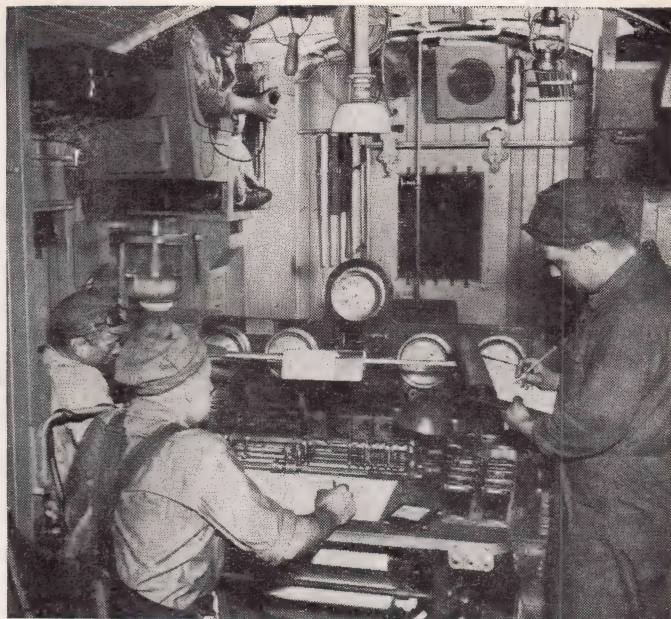
During a run, test instruments are read every five minutes and continuous records are kept of temperatures, drawbar pull, speed, air pressure in train line and brake cylinders, revolutions of stokers, and what-not. A complete test of a new locomotive occupies about three months.

TEST TRAIN, ready to leave Albany, New York, for 140-mile run to Syracuse, comprises 22 passenger coaches, dynamometer or instrument car, and the iron horse under observation. Four observers ride behind windshield at head end of New York Central's new 6,000-hp. steam hauler.

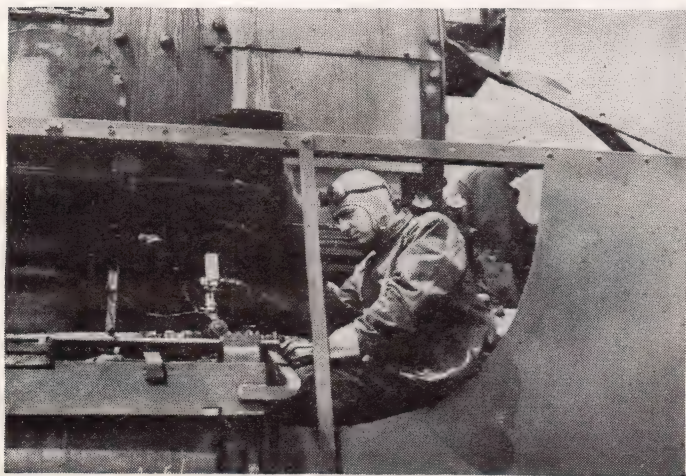




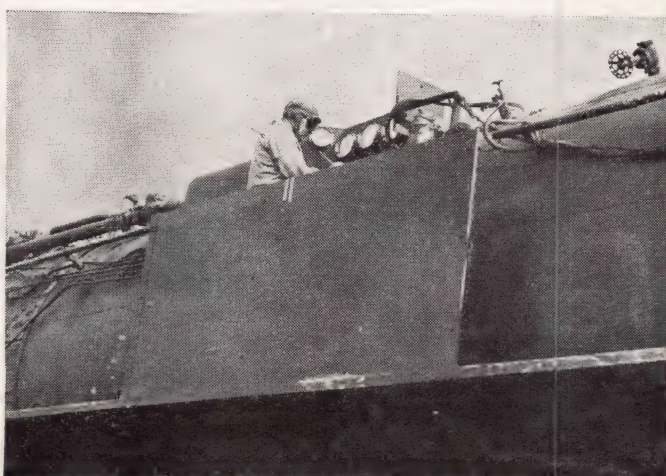
CAB OBSERVER, seated behind the fireman, records steam pressures from gauges on locomotive's boiler, and by microphone periodically reports his readings to dynamometer car.



CHRONOGRAPH TABLE, in the dynamometer car directly behind locomotive, records the test. On a moving strip of paper are set down 21 recordings: time, speed, pulls, etc.



STEAM PRESSURE in cylinder of locomotive will be recorded by equipment this technician is setting up. He's one of four observers who ride behind the front-end windshield.



ON THE RUNNING BOARD a technician behind his shield watches steam pressure and front-end drafts while the train speeds along. Parts manufacturers take part in the tryouts.

END OF TEST RUN finds observers gathered in dynamometer car. It has a shower, galley, dining space. Men who pass coal are easily identified.





Fooling Your Senses

Discover for yourself
that your sensory organs are
not as accurate as you think

WHICH IS WHICH? Without use of eyes and nose a smoker usually cannot distinguish between a lit and unlit cigarette. In-

dividual senses are easy to fool, because they work best in teams. With the nose blocked, apple and onion will taste the same.

EFFICIENT as they are, your senses are easily fooled. The explanation of that lies in the way your nerves transmit impulses, or messages.

Each sense organ is like a trigger. Anything springing, or stimulating, it automatically starts forth a nerve message that travels to the part of the brain set aside for registering the messages of that particular sense. That part of the brain interprets any stimulus, or message, in its own unchanging way.

Thus, touching a cold pin to a skin spot sensitive to cold registers with the brain a sensation of cold; on a spot sensitive to touch the same pin registers the stinging sensation usually associated with a pin.

Press a finger against your closed eyelid. The pressure stimulates the eye retina, and you "see" a dim light that really isn't there. That explains, too, why a blow on the head makes you "see stars."

Whatever the sensation, the message is a little jolt (disturbance) that travels along a nerve; it all depends upon which sensation organ picks it up.

Every square inch of the skin is dense with small sense organs. Explore your skin with a pin's point. By noting where the pin point is felt, you can locate the touch spots. With a warm or a cold pin you can find the sensory spots for warmth or cold.

Photos by Camera Clix

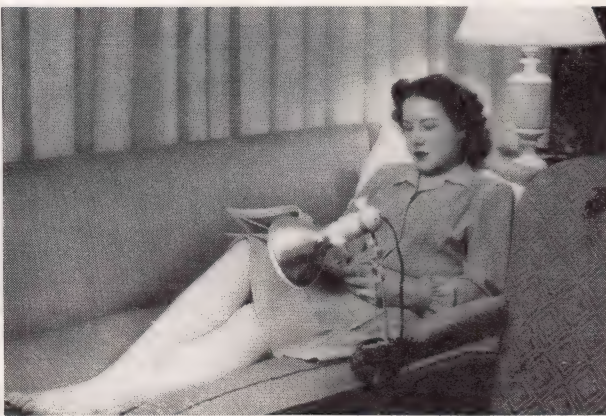
SMELLING GAME. When blindfolded, you will have quite a time telling the difference among coffee, tobacco, and onion odors. We depend mainly on eyes and ears; lower animals rely on their keener sense of smell.



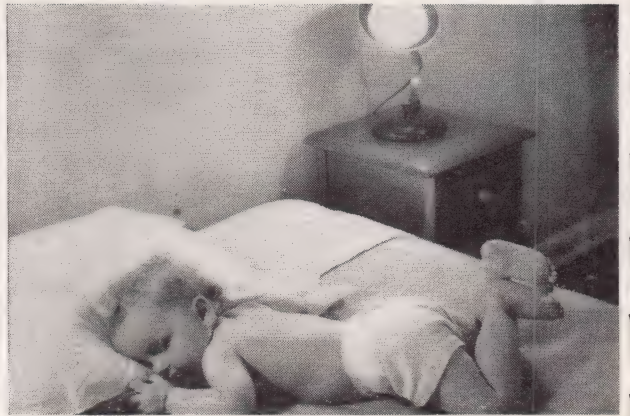


Happy is the home this sun shines ~~on~~ in

It's no trick
now to bring sunshine
benefits right into the home...
with lamps made by General Electric. For
the same painstaking, energetic research that is
always at work to make G-E lamps *Stay Brighter Longer* has
developed new lamps that make for better health, easier seeing,
new comfort and charm... light for better living. Here are some ways
they'll help make your home healthier, more comfortable, more enjoyable.



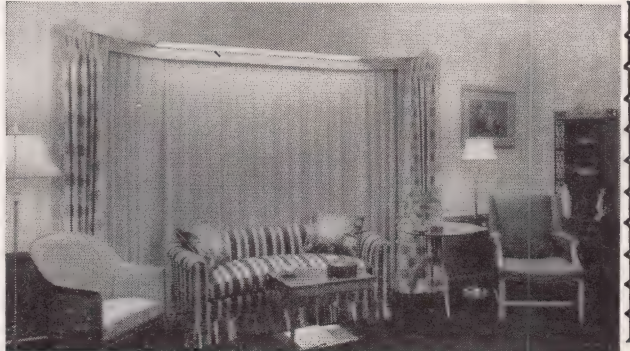
This G-E sunlamp fits into ordinary home light sockets. Makes baby's sunbath easy in any weather. Gives healthful ultra violet to help all the family keep that summer tan.



G-E heat lamp feels so-o-o good! Provides soothing sun-like warmth for aches and pains. Speeds up drying hair and nail polish. Keeps baby warm while being dressed.



G-E fluorescent lamps can bring "daylight" to Dad's workbench... to make hobbies or repair jobs easier. Grand in the laundry, too... speeds ironing, adds cheerfulness.

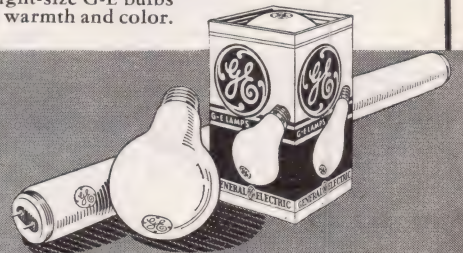


G-E Slimline fluorescent or regular G-E fluorescent lamps can "daylight" couch and drapes for new beauty, easier seeing... while right-size G-E bulbs in floor lamps add warmth and color.

G-E LAMPS

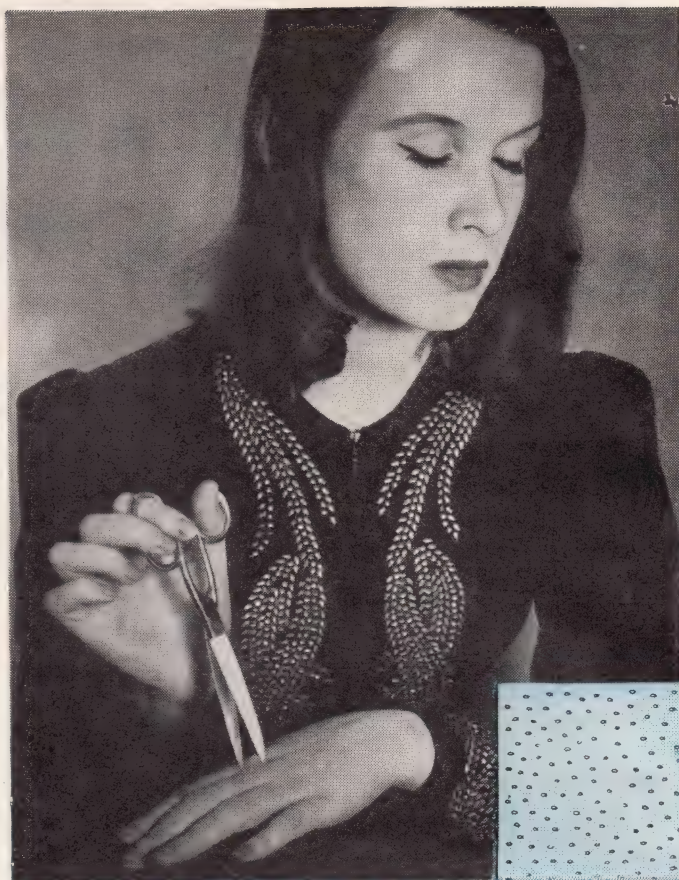
GENERAL  ELECTRIC

Stay Brighter Longer!





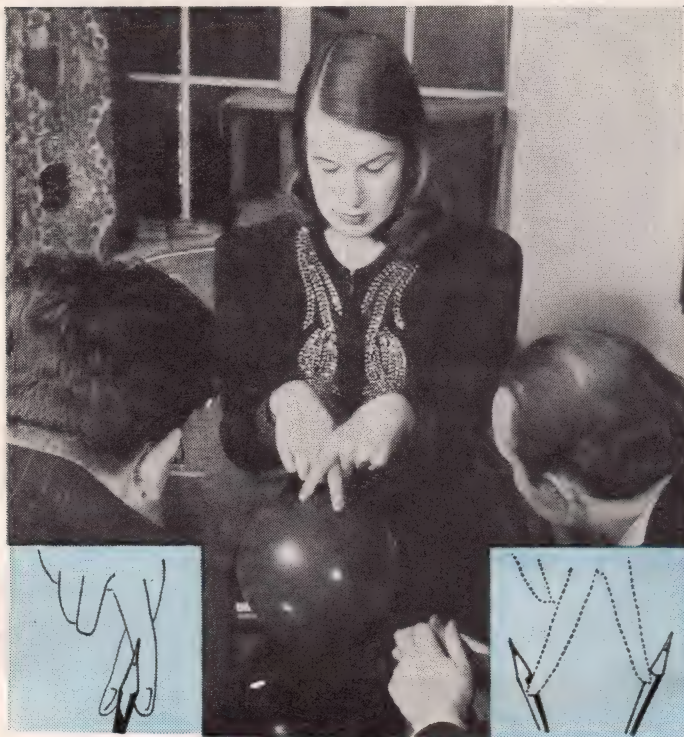
ONE POINT of scissors is all this girl feels when both points are touched to back of her neck. Points must be about three inches apart before they are felt as two. Skin of back of the neck is very insensitive, because it has relatively few touch spots.



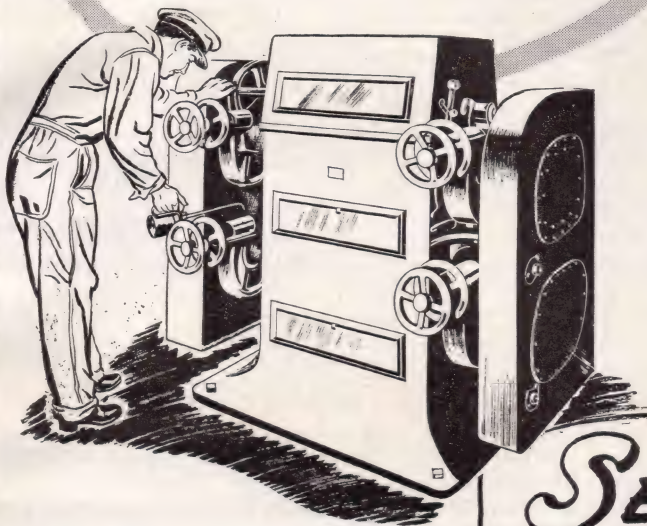
TWO POINTS are felt when scissors points are touched to skin near finger, though now separated by less than an inch. Closer touch spots make this region more sensitive than back of neck; tips of fingers and of tongue are even more sensitive to touch.

CROSSED FINGERS place touch spots in unusual position and make them send confusing messages. The girl's fingers report that there are two bowling balls, instead of only one. Same effect is attained by touching crossed fingers with a lead pencil.

SWEET TASTE without sugar results from pressure of a clean stick to tip of tongue. Pressure stimulates taste-organs; brain gets report of sweetness. At back of tongue, stick tastes bitter. Salt and sour tastes are concentrated at sides of tongue.



UNLOCKING SECRETS OF THE SOY BEAN..



THE SOY BEAN, ONCE PLANTED ONLY AS A ROTATION CROP, WAS PLOWED UNDER TO INCREASE THE FERTILITY OF THE SOIL.

THEN SCIENCE DISCOVERED THAT SOY BEAN FLOUR IS WHOLESOME...THE OIL MAKES GOOD PAINTS AND SALAD DRESSING...THE MEAL IS GOOD CATTLE FEED...THE FIBRE MAKES PLASTICS.. BUT FIRST EXTRACTION METHODS DIDN'T GET ALL THE OIL...ONLY PARTIALLY SEPARATED THE OTHER INGREDIENTS.



90% OF ALL SOY BEAN MILLING TODAY IS DONE WITH A-C EQUIPMENT. THIS WORK THAT ALLIS-CHALMERS HAS DONE WITH SOY BEANS GOES ALL THE WAY FROM PLANTING AND HARVESTING THROUGH MILLING AND PROCESSING. IT IS TYPICAL OF THE ENGINEERING AID A-C OFFERS TO EVERY BASIC U.S. INDUSTRY.

ALLIS-CHALMERS
MANUFACTURING COMPANY,
MILWAUKEE 1, WISCONSIN

SENSATIONAL NEW OIL EXTRACTION METHOD DEVELOPED BY A-C SCIENTISTS

REVOLUTIONARY SOLVENT EXTRACTION MACHINERY NOW SEPARATES SOY BEAN OIL, PULP AND MEAL EFFICIENTLY—AT LOW COST AND EXTENDED USE OF THIS EQUIPMENT IS INCREASING THE YIELD FROM OTHER OIL-BEARING MATERIALS SUCH AS FLAXSEED, COTTON SEED, COPRA, PALM KERNELS, PEANUTS AND MEAT SCRAPS.....

ALLIS CHALMERS

ONE OF THE BIG 3 IN ELECTRIC POWER EQUIPMENT
BIGGEST OF ALL IN RANGE OF INDUSTRIAL PRODUCTS

MICROFACTORIES at Work in the Sea

Diatoms give us things like vitamins and dynamite, building materials and filters—and probably our petroleum

MILLIONS of years ago these minute plants began building up vast natural resources—and they're still at work. You have probably never seen one, but they live in uncounted billions in every ocean, lake, and stream.

In prehistoric times, some authorities are convinced, they manufactured the oil that now runs our motor cars and furnaces. Today they are making the edible oils from which we get our vitamins A and D. Each year we mine more than 150,000 tons of their fossilized remains. They are present wherever light and moisture come together, yet so inconspicuous that few people have even heard their name—diatom (rhymes with “buy-a-tome”).

Invisible to the naked eye, under the microscope these one-celled plants are among the most exquisite of nature's creations. Distinguished from other microscopic plants chiefly by the intensive use of silica in forming their delicate “glass” houses, all diatoms are alike in having two shells that fit

together like box and boxlid. But beyond that, each of the 10,000 or more diatom species has its own architectural style.

The intricate diatom structure is tied in with its life processes. The diatom must absorb food and gases: the shell is pierced with many fine holes. If the diatom is to float, the shell must be very thin: then flotation will be aided by the large shell surfaces. And through such engineering devices as internal ribs, partitions, and corrugations the diatom shell represents a maximum of strength with the smallest weight.

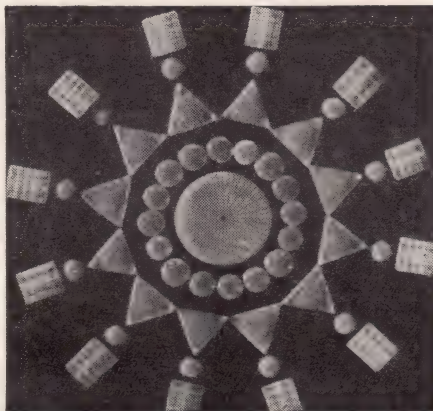
Source of fish-liver oils

Diatoms are primarily water plants. Sometimes called the “grass of the sea,” they feed the tiny fish upon which big fish live. Oysters grow plump on diatoms. Unlike most plants, diatoms manufacture and store oil instead of sugar or starch. The vitamin-rich oils in the livers of halibut, cod, and sharks are initially produced by diatoms and later accumulated and stored in the fish from which we get them. (The Dow Chemical Company has recently been conducting experiments to discover a

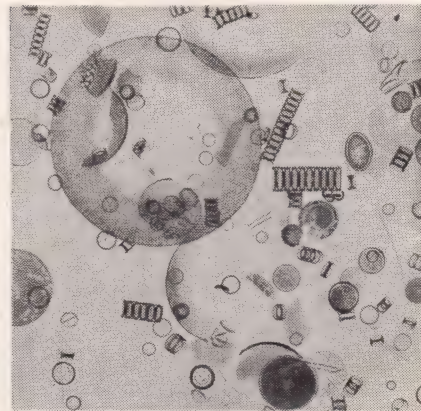
(Continued on page 89)

OCEAN DWELLERS. Diatoms like those shown (magnified 60 times) at left live by billions in all oceans of the world. They serve as food for marine animals.

Photos by Philip O. Gravelle



DIATOM PATTERNS fascinate microscopists who like to arrange them in symmetrical forms like the one above.



FINE DETAILS of diatom shell markings are used to test efficiency of microscope lenses. These are assorted fossil diatoms.

"It is not the finding of a thing, but the making something out of it after it is found, that is of consequence"

—JAMES RUSSELL LOWELL



Why some things get better all the time

TAKE THE MODERN ELECTRIC LIGHT BULB, for example. Its parts were born in heat as high as 6,000° F. . . . in cold as low as 300° below zero . . . under crushing pressure as great as 3,000 pounds per square inch.

Only in these extremes of heat, cold and pressure did nature yield the metal tungsten for the shining filament . . . argon, the colorless gas that fills the bulb . . . and the plastic that permanently seals the glass

to the metal stem. And it is because of such materials that light bulbs today are better than ever before.

The steady improvement of the electric light bulb is another instance of history repeating itself. For man has always



had to have better materials before he could make better things.

Producing better materials for the use of industry and the benefit of mankind is the work of Union Carbide.

Basic knowledge and persistent research are required, particularly in the fields of science and engineering. Working with extremes of heat and cold, and with vacuums and great pressures, Units of UCC now separate or combine nearly one-half of the many elements of the earth.

UNION CARBIDE

AND CARBON CORPORATION

UCC

Products of Divisions and Units include—

ALLOYS AND METALS • CHEMICALS • PLASTICS
ELECTRODES, CARBONS, AND BATTERIES
INDUSTRIAL GASES AND CARBIDE



Rescue plane, flying five feet off the ground, dusts an Alabama peanut field with an insecticide.

Science Saves a PEANUT CROP

The velvet bean caterpillar was cleaning up fast, but technologists stopped its devastating feast in 60 hours

THIS year the 30,000 peanut farmers of the Southeast's Wiregrass section (Alabama, Georgia, Florida) put in more than 1,500,000 acres worth \$150,000,000, about half of the U. S. peanut crop. It was a year for velvet bean caterpillars. Early in August the infestation began. By mid-August the farmers, standing in their fields, could almost see the foliage disappearing from the peanut vines. Caterpillars eat voraciously. The powder for that is an

old stand-by, a dust made from cryolite ore.

Quickly the farmers exhausted the cryolite insecticide in their area. And the second generation of caterpillars had hatched to endanger 80 percent of the year's crop. An urgent appeal went from the Wiregrass to the Pennsylvania Salt Manufacturing Company, Philadelphia, on August 15.

Pennsalt's technologists had warned of the caterpillars, and laid up a store

of its Kryocide at Natrona, Pennsylvania; but that was 600 miles from the stricken area. Within 60 hours after the SOS, an American Airlines plane, loaded five times, had flown 100,000 pounds of the insecticide to dusting equipment in the peanut fields. Trains and trucks sped south with 3,500,000 pounds more. "We have the caterpillars under control," the farmers said on August 21.

Peanuts rank tenth among cash row crops in the United States. About 90 percent of the peanut crop is food. We eat peanuts this year.

STRIPPED. Caterpillars have devoured leaves of peanut plant at right, but scarcely touched vine at left. Farm owners in South saw the insects at work on whole fields.



AT DEAD OF NIGHT a dusting plane is loaded with cryolite insecticide for a dawn take-off over stricken peanut fields. To step up the attack on pests, dusters taxied right under wings of cargo planes for their loads.





Something has been done about the weather!



YOU can't change it, that's true. But you can do a lot of things these days to keep it from causing you too much trouble.

The girl in the picture, for instance... she's wearing a raincoat and hat that have been processed in a new way to keep her dry. By impregnating the fabric with certain chemicals, the hat and coat stay water-repellent—even after washing or cleaning.

Koppers has a similar way of protecting *timber* against the weather. It's called pressure-treatment. You take a piece of timber, force out all the air in the cells, and replace it with creosote or other chemicals under great pressure. This pressure-treated wood is many times more resistant to weathering, decay, moisture and fire than untreated wood. Lasts more than three times as long. Does its job better. Saves money. Saves millions of trees.

Another thing—when timber is pressure-treated by Koppers, termites and marine borers won't attack it.

The preservative treatment of approximately 40,000 carloads of forest products every year is just one Koppers job. Koppers also produces chemicals from coal for scores of manufacturers to use in making hundreds of things you use every day. It manufactures couplings, roofing, paving materials, airplane propellers, piston rings. It designs and builds most of America's coke ovens.

Chances are there's a Koppers product or service which can help to make *your* job easier, *your* business more profitable. Why not talk to us about it? Koppers Company, Inc., Pittsburgh 19, Pa.

The industry that serves all industry...

KOPPERS





NEARING THE HORIZON, the sun, pictured by Mount Wilson telescope, looks flattened due to refraction (bending of light). Atmosphere slows light waves a bit and changes their direction.



SUNSPOTS, in next to biggest group ever recorded, are seen at lower right on sun's face. The sun is starting to disappear behind slope of San Gabriel Peak, about six miles from telescope.



LIKE FIERY SMOKE that seems to rise from profiled trees on the mountain ridge, the sunspot group appears through telescope. This photo was taken about a minute before the one at the right.



ABLAZE, the sun vanishes. Sinking sun's rays must pierce more and more air, dust, and smoke. Short blue and violet light rays are absorbed, but the longer orange and red ones get through.

Sunset by TELESCOPE

SOME visitors at Mount Wilson Observatory are lucky; they are given an opportunity to see a sunset reflected on the screen of a 60-foot solar telescope. And watching a 12-inch telescopic image of the sun as it goes down, the observer has practically a ringside seat at one of nature's most spectacular shows.

The climax of the spectacle arrives when the sun begins to drop behind the California ridge six miles to the west of the observatory. On a particularly lucky evening the privileged observer at the telescope may see, just above

clumps of trees, a set of sunspots that could be mistaken on the viewing screen for smoke from a deep-hued forest fire. Another time there's a fleeting glimpse of a hydrogen-gas explosion that causes tongues of flame to shoot from the solar surface.

Astronomers use the solar telescope to make a continuous motion-picture history of the sun, year after year. It is difficult, however, to capture on photographic film the subtle colors unfolded on the telescope's screen.

Edison Hoge, head of Mount Wilson's photographic department, made the accompanying color photos exclusively for *SCIENCE ILLUSTRATED*.

To get true colors in the pictures, he used the towering solar telescope itself as a camera, instead of making color shots of the changing spectacle that the telescope was throwing on its viewing screen.

The natural-color views of the sunspots at sunset are most remarkable. To get them, photographer Hoge exposed daylight Kodachrome film via a focal-plane shutter at 1/1,000 second. The 12-inch lens at the top of the telescope has a 60-foot focal length. No filter was used.



Mandrill

No, he didn't fall into a paint box. Now 14, he's looked like this all his adult life. Picture shows him half life-size. A member of the baboon family, he weighs 70 pounds, has a fiendish temper, is gaudiest of all mammals. (Female mandrill is more subdued in color and disposition.) He hails from West Africa, displays his flashy phyz, and equally polychromatic stern, at St. Louis' Forest Park Zoo. Surprised by cameraman Russell Froelich, he made a lightning lunge, was snapped in midair five feet from camera. Shutter speed, 1/1,000 second; Froelich's blood pressure, 200.

Post-Dispatch (B-5)

Ektachrome— Color with a PUNCH



Photographs by Allan Gould

CORRECT EXPOSURE brings out detail in the black coat as well as in the light areas.

The new color film that you develop yourself

enables you to catch every lifelike hue

Now there's a color film for everybody. Created to meet the widely varied conditions in wartime aerial photography, Ektachrome is nearly foolproof when used in the amateur's camera. Illumination is no longer a special problem. Even when the subject is in shadows, formerly a prime obstacle for color photographers, the basic hues are faithfully reproduced.

Best of all, you can develop Ektachrome with standard darkroom equipment in only 90 minutes, and turn on the light after the first 19. The chemicals are as safe and easy to use as those for everyday black-and-white film. How it's done, and the strange way in which the image appears, are told on page 74.



OVEREXPOSED a hundred percent, photo above still holds true hues and detail.



UNDEREXPOSED a hundred percent, photo at left shows fidelity of color in shadow.

A Salute to EDWARD U. CONDON

His swift, cheerful thinking recreates the Bureau

of Standards, which he gears to an age of atomic power

TODAY there is a new breeze blowing through the wide stone corridors of the National Bureau of Standards. From the upper-floor office of the director comes a new spirit of energy, of enthusiasm, of imagination. Within the range of that breeze, the Bureau will not remain chiefly the supreme arbiter of engineering and industrial standards that it has been, but will assume leadership in creative research.

Well out on Washington's Connecticut Avenue, in a spread of 90 formal brick buildings, the Bureau looks for all the world like a university. Its solid dignity, however, represents a foundation stone of American industry.

In the Bureau are treasured the national and international standards of length and measures, of weights, and of a myriad instruments. Almost every industrial operation is based on its standards of quality, performance, and practice; including the measurement of materials, temperature, electricity, pressure, and power. It serves engineers of all types by testing instruments, by devising methods of testing and of analysis. For over 40 years the Bureau has been the last word in precision, and is the authority of the Government in scientific and engineering matters.

Stand-by of science, industry

Like the Bureau itself, the directors have been men of dignity, integrity, and precision. But now the scope of governmental research, both civilian and military, is being enlarged, and the qualities of leadership displayed in the Bureau of Standards are increasingly important to American industry and science.

The cheerful air, crackling imagination, and irresistible enthusiasm that refresh the halls and offices of the Bureau today come from the new director, Dr. Edward U. Condon.

It is almost a shock to see Ed Condon in a staid office surrounded by many models of things past. In shirt sleeves, when seated behind his unlittered desk, with his neck and almost his face overflowing beyond his collar, he is the picture of a powerful farm boy: young, heavy, firm, strong. But when he speaks it is with a smile; when he outlines a project he bursts into

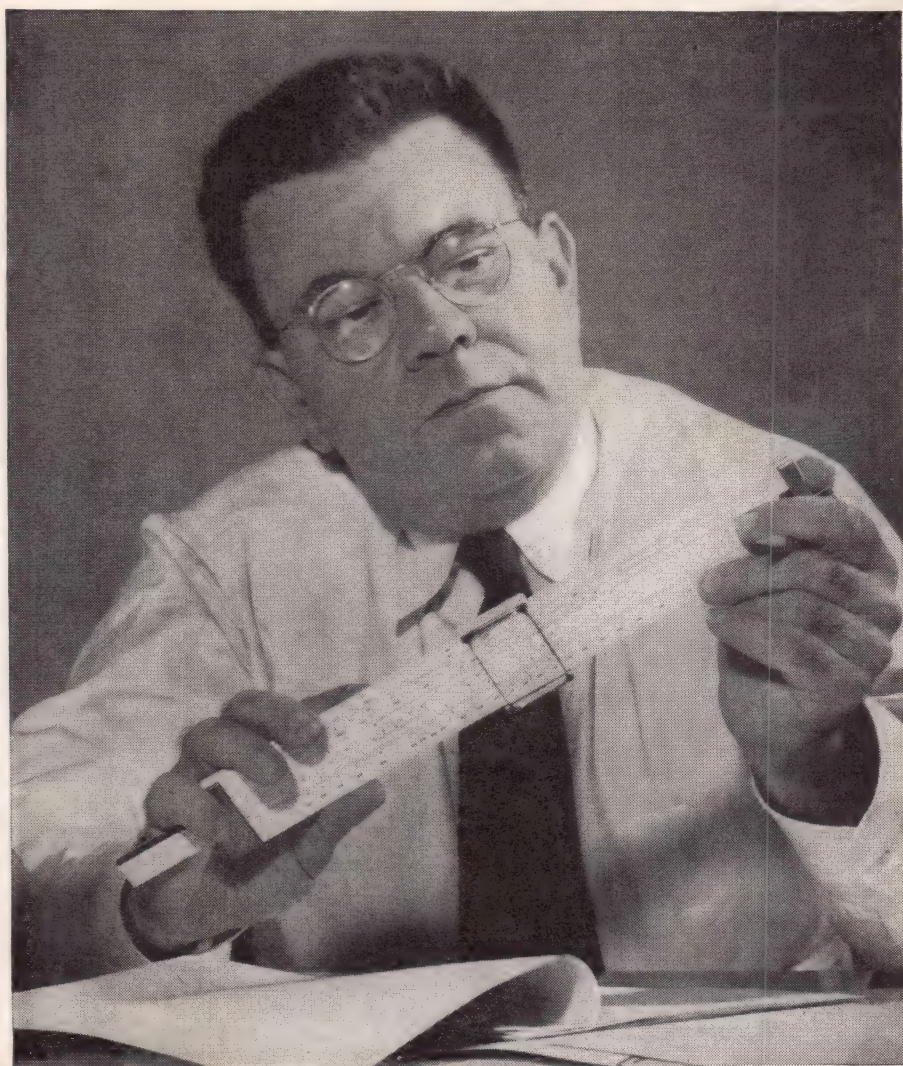
joviality. His keen eyes flash; it is apparent that his mind is leaping ahead. His swift and cheerful thinking strikes a new note for bureau chiefs.

Ed Condon was born near the scene of the first atomic bomb explosion; at Alamogordo, New Mexico, not 45 years ago. His training in physics was at California. He taught a year at Princeton, a year at Minnesota, and then seven years at Princeton, as an active professor of atomic structure and nuclear physics, not as an engineer. Then the

unexpected happened and he was called to the Westinghouse Research Laboratory at Pittsburgh to be associate director. That was in 1937, when he was only 35. Westinghouse had long-range plans in atom smashing and in the search for atomic power.

Inevitably the war involved Ed Condon. What he did for the atomic bomb and radar has not been told, but SCIENCE ILLUSTRATED salutes him for his service to the Congress during the frantic days (*Continued on page 88*)

Harris & Ewing

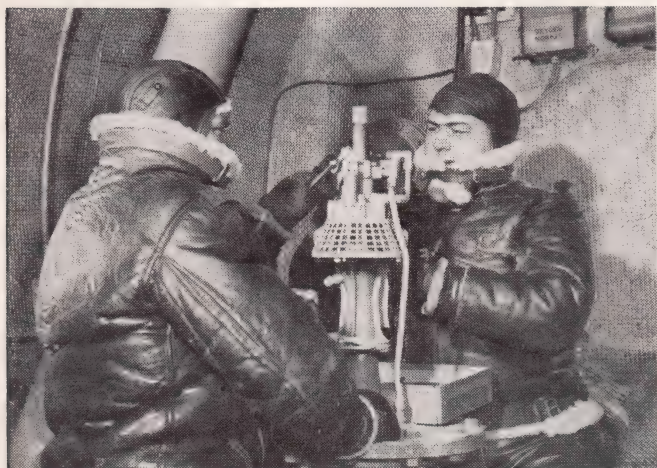


DR. EDWARD U. CONDON—"for service to the American Congress in frantic days."

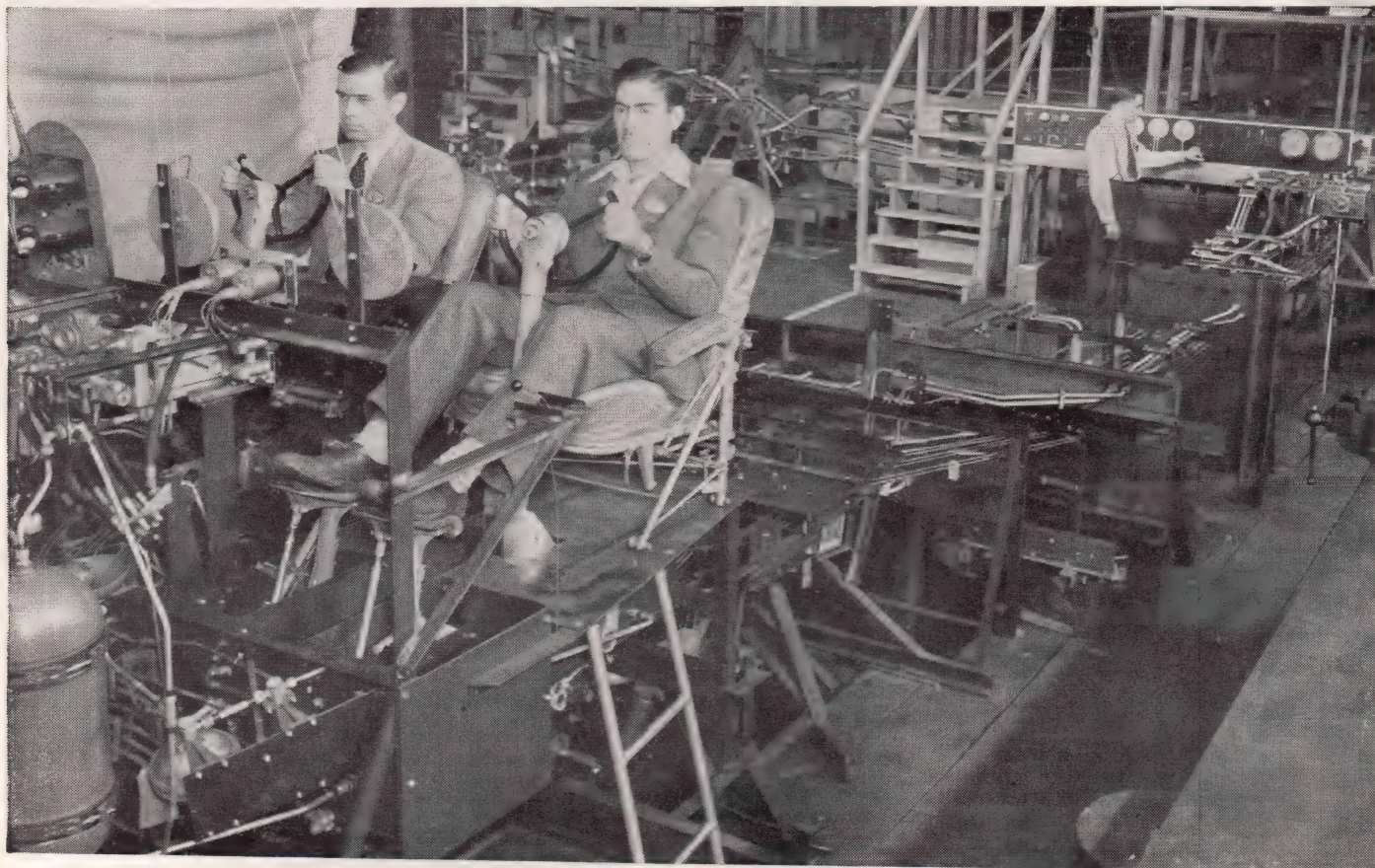
FLYING on the Ground

Experts wreck planes in laboratories
to insure happy landings for air travelers

By WILLIAM S. BARTON



HOW MUCH CAN IT STAND? Fur-clad technicians (above) in a laboratory cold chamber find out how a cabin air-pressure regulator will work in the frigid stratosphere. Below, pilots "fly"



FLYING through the air at 250 miles an hour, two miles above the ground in a commercial airliner, you are about 20 times as safe as you would be if you were tooling your own car along a highway on a Sunday afternoon.

This is true—and statistics vouch for it—because American aircraft builders employ thousands of experts to wreck planes scientifically in the laboratory. The chances are that the structural prototype of the plane in which you are riding was subjected to $1\frac{1}{2}$ times as much stress as the plane will ever have to endure; engineers have satisfied themselves that it could fly at least 25 percent faster and considerably higher, without flutter or structural failure, than it will ever be called upon to do.

For all this, the test pilot still has an important role in making planes safe. But the ground work is so exact that head men at the plants no longer bother to go to the field when a new model is to be test-flown.

A single large California aircraft manufacturer spends \$2,000,000 a year on testing and research to make flying safe. Engineers put in 6,000 hours to "fly" a single model to the point where it would begin to go to pieces in the laboratory. Great spider-webbed structures as high as a five-story building are erected so that stresses can be spread over fuselages and tails with hydraulic jacks. Several weeks' work by 175 technicians was required to complete a vibration test that shook the entire plane for days at a time while electronic instruments recorded the results. Sometimes the tests are calculated to ruin the plane that serves as guinea pig. In the structural test of one of the largest new transports, however, the plane was loaded and strained 75 percent beyond its designed capacity, but no harm resulted and it is now rolling up air mileage in service.

Testing has reached its present high state of thorough-

a Constellation on the ground. For three years veteran flyers put this control-system mockup through its paces, subjecting it to deliberate abuse that might have been fatal in actual flight.

"Our garage could have been a mile from the house..."

Writes LLOYD A. TUPPER
Highland Park, Illinois

Minneapolis Honeywell Co.
433 E. Erie St.,
Chicago, Ill.

Attention Mr. W. Baak

Gentlemen:

Our garage could have been a mile from the house and just as much heat would have reached the rooms above it.

The truth is the garage is attached to the house as the picture enclosed shows very clearly — but who would have known that from the amount of heat that entered those rooms during the heating season.

Auxiliary heat was always needed until your engineers got to work on the entire heating plant. Moduflow was installed together with some minor changes in the distribution system.

The same plant now keeps those rooms over the garage comfortable in any kind of weather, and in addition the heat is more evenly distributed throughout the entire house.

Your engineers did a wonderful job. We're all very happy

Very sincerely,

Lloyd A. Tupper

177 Lakeside Manor Road
Highland Park, Ill.



MODUFLOW FOR APARTMENTS

NOW — "Personalized" heat control brings Moduflow to new and existing apartment buildings. It will be a "must" in modern apartments just as the mechanical refrigerator is today



Have you a room that is "a mile from your house" so far as heat is concerned? Are your floors drafty? Have you "shiver spots" in some rooms? Are you wasting fuel because of unequal and inefficient heat distribution?

If so, you need Moduflow, the remarkable new heating control system developed by Minneapolis-Honeywell. For Moduflow is entirely different from ordinary on-and-off control systems. It furnishes heat *continuously* at whatever temperature is required to maintain comfort in any kind of weather. Because heat supply is continuous, cold air doesn't have a chance to pile up on the floors or in remote rooms. And, you can save fuel formerly wasted due to overheating the rooms nearest the source of heat.

Moduflow has cured these "heating headaches" in thousands of homes throughout the nation. It can be simply and inexpensively installed on practically any type of automatic heating plant. You don't have to remodel or wait until you build a new home.

Of course, if you are planning to build, your new home deserves the "Comfort Unlimited" that Moduflow has brought to the Tupper and to thousands of other homes. So, get the whole story of Moduflow. Just mail the coupon for the fascinating booklet, "Comfort Unlimited."

MODUFLOW

The New HONEYWELL Heating Control System



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Attractively illustrated, easy to read and understand; tells how MODUFLOW control can be applied to your automatic heating plant.

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Please send my free copy of "Comfort Unlimited"

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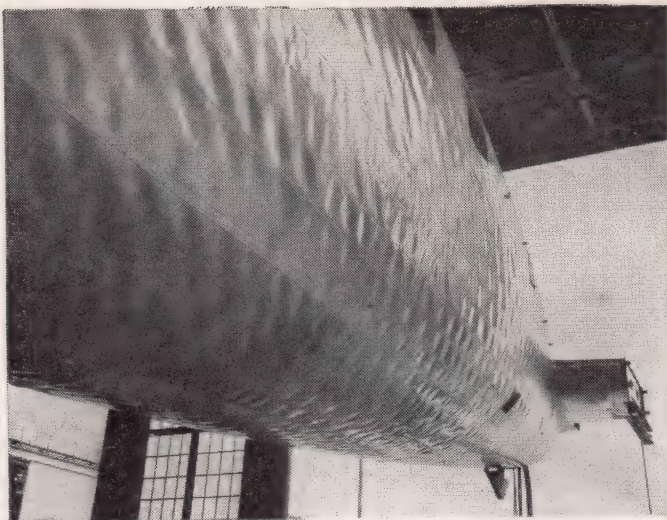
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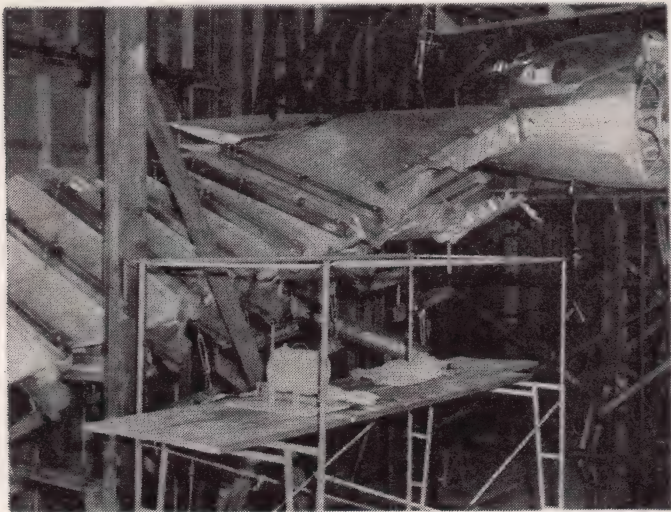
ness largely because of a multitude of new devices that not only eliminate the element of human error in recording results but literally save years of time. An example is a large illuminated glass panel on which test data register. Numbers and code letters used to be laboriously copied; now the panel is automatically photographed every few seconds.

When you fly today, you needn't worry about what will happen if an engine fails. Any large plane of recent design will get home with one or even two engines dead. What is more, most of the other vital mechanisms and controls have emergency duplicates or stand-bys. If one fuel pump fails, another is ready to take over. Small motors operate the landing gear; if they fail, hand-operated levers will do the job. Even the supercharger for a pressurized cabin now has a twin stand-by. In the Constellation, elevators are controlled by three hydraulic power units, any one of which will start the plane up or down.

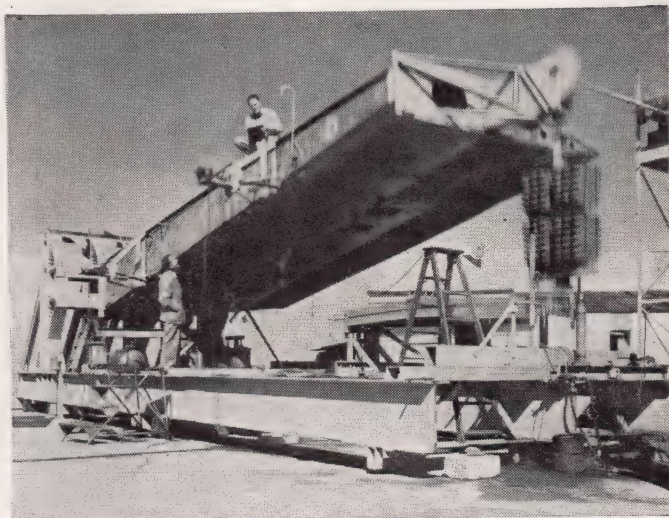
The airplane today is probably the most dependable mechanical creation of man. And it is testing—on the ground—that has given American transport aircraft the reputation of being the safest in the world. (END)



TORTURE RACK wrinkles the skin of a DC-6 fuselage as a hydraulic jack, anchored in six tons of lead, pulls down on tail. Uniform wrinkle pattern shows that load is evenly distributed.



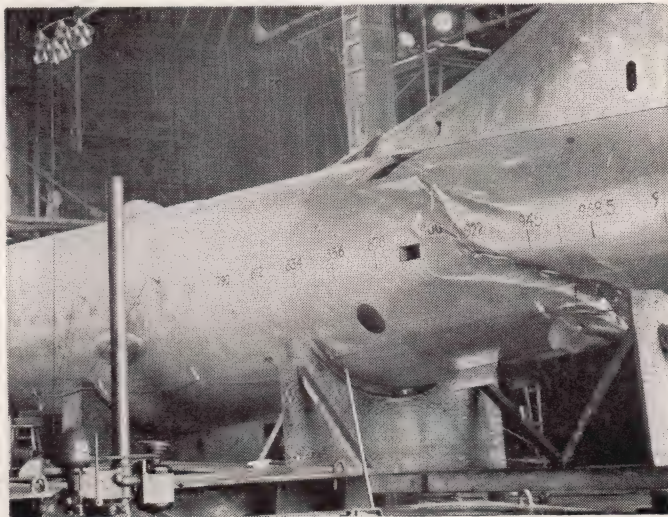
A BROKEN WING can make flying safer—if it happens on the ground. A half million pounds' pressure, applied by jacks in the Boeing static-test laboratory, did this to the wing of a B-29.



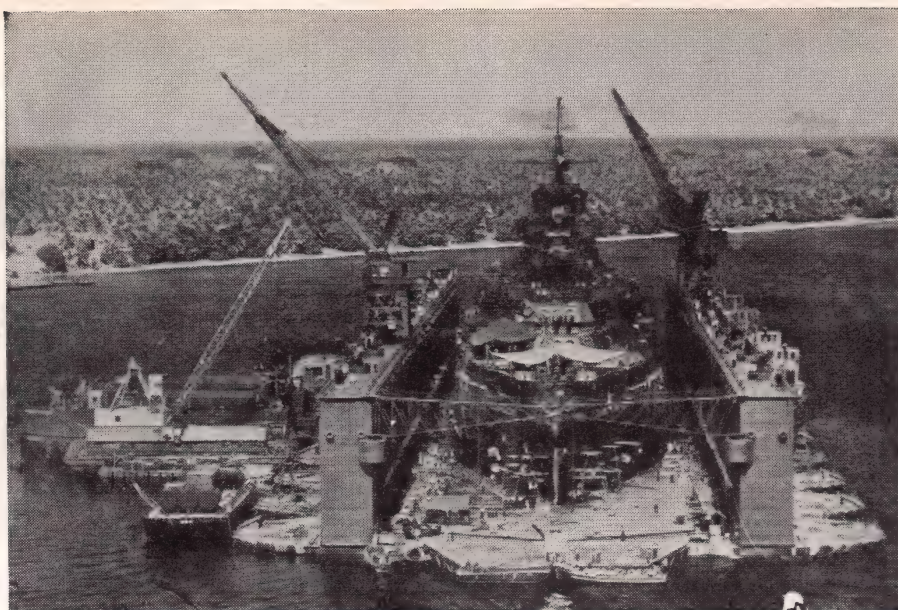
SHAKING OF ITS LIFE is given a huge wing section at the Lockheed factory. A powerful vibrator attached to one end puts the structure through an ordeal it will never meet in service.



DROP TEST at Lockheed's Burbank plant makes sure plane won't break a landing strut or blow a tire in a bumpy sit-down. Lead bars overload plane; straw bales are emergency shock absorbers.



BODY DESTRUCTION TEST on the B-29 Superfortress. The same thorough engineering that protected our military flyers is now insuring the safety of passengers on commercial airliners.



CRADLE OF THE DEEP. Dry dock supports U. S. S. Idaho, ready for repair. Dock was first submerged by flooding compartments until ship could be warped in above keel blocks. Then water was pumped out and the dock raised to bring ship and work deck above water line.

Seagoing Dry Dock

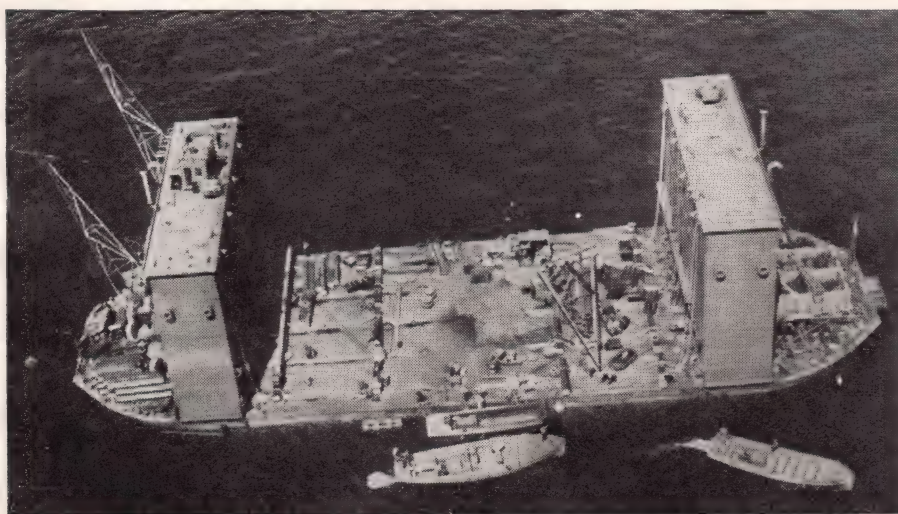
WHEN U. S. battleships in World War II ranged far from home, independent of fixed repair bases, they owed their increased operating range to the Navy's ABSD's—sectional floating dry docks that followed the fleet to harbors in advance areas.

ABSD's are of two types. The newer, smaller one is made up of seven sections with total dimensions of 122 by 725 feet and can lift 55,000 tons. The other, a ten-section dock 140 by 827 feet, has a capacity of 90,000 tons. By comparison, the ARD, most mobile

single-unit dry dock, is 490 feet long and can lift only 3,500 tons. The ABSD has the additional advantage of being able to pick up and repair one of its own sections if it happens to be damaged.

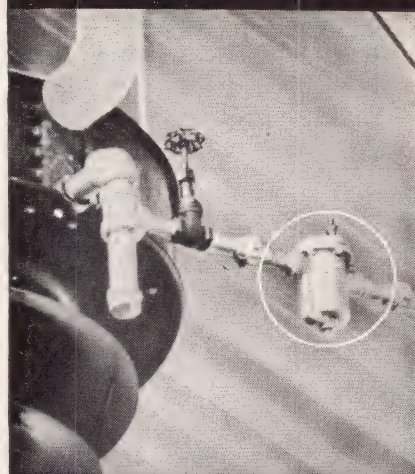
Units are identical except for equipment. Two have galleys below; the others, crew quarters. One has a control house; two carry cranes.

The ABSD generates from 5,600 to 7,000 kilowatts, converts 35,000 gallons of fresh water daily, and provides its own compressed air.



ON ITS OWN. Single section of dry dock is huge welded steel pontoon. Interior is divided into compartments for flooding. Walls fore and aft may be folded and carried flat. To assemble dock, seven to ten uniform sections are lined up sidewise, adjoining walls welded.

HOW TO TRAP



UNIT HEATERS

for—
BETTER HEATING!

Advantages Offered by
Armstrong Traps

WHETHER you use low pressure or high pressure unit heaters, application of Armstrong traps gives you these important advantages:

1. FULL HEATER CAPACITY. Heaters drained by Armstrong traps are kept dry! No waiting for condensate to cool before trap opens. No cooling leg is necessary.

2. AUTOMATIC AIR VENTING. No separate air vent is required. Both air and condensate pass out through same valve. Minimum maintenance, minimum repair cost.

3. PROTECTION AGAINST CORROSION. Prompt removal of air and condensate from heater minimizes danger of CO₂ or oxygen causing corrosion.

4. LONG VALVE LIFE. All internal mechanism is stainless steel. Valves are same quality as used for 2400 p.s.i.

Ask for a copy of "TRAPPING TIPS" on unit heaters. See your local Armstrong representative or write.

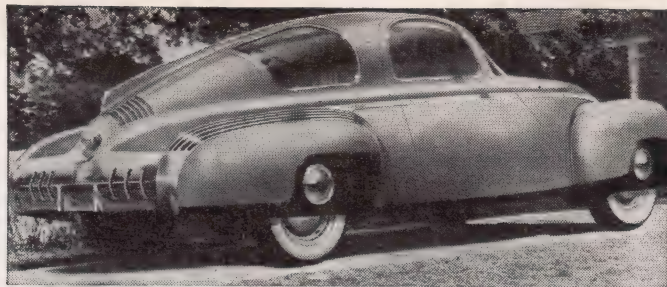
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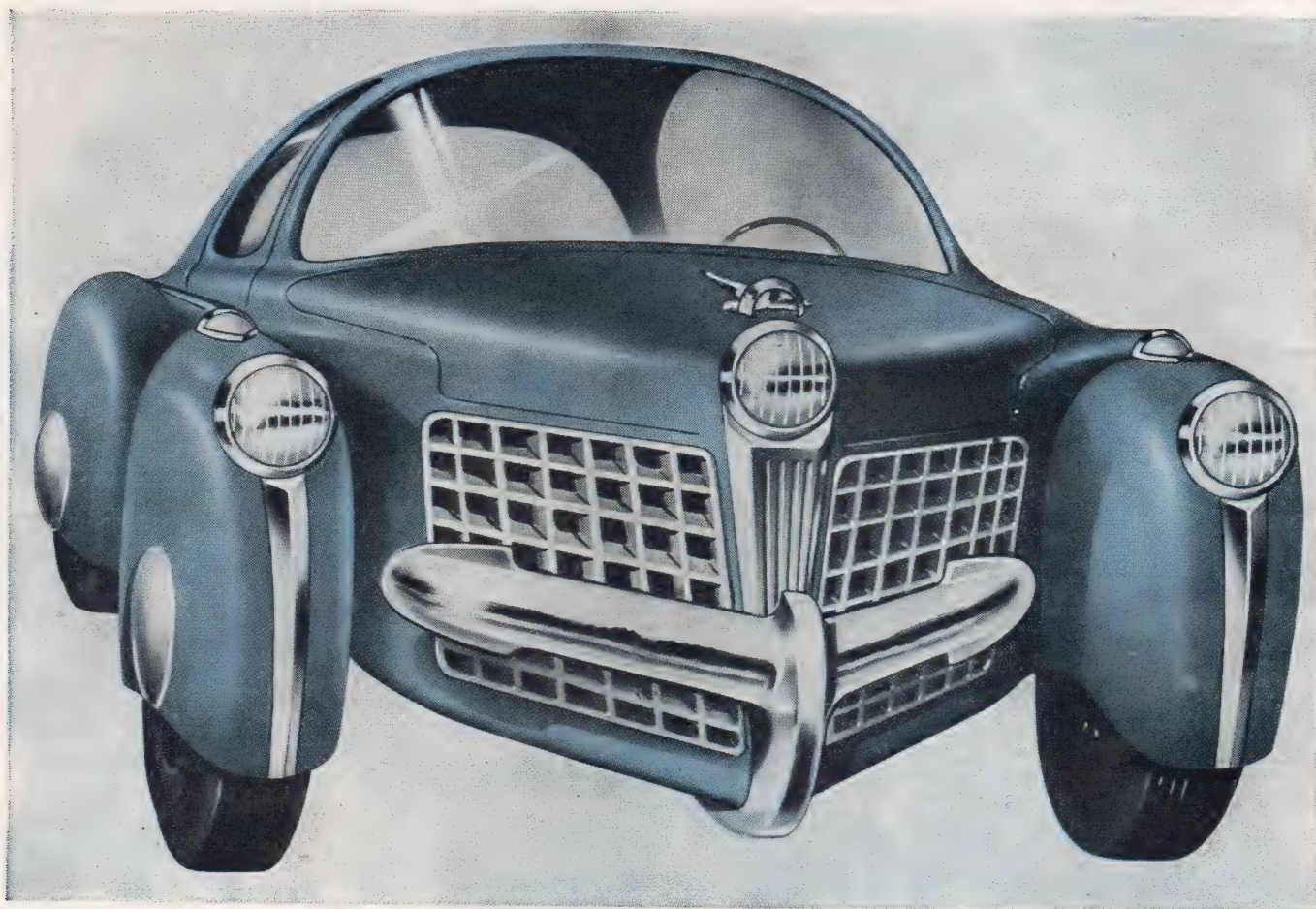


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TORPEDO ON WHEELS



LONG, LOW, and streamlined, the Tucker Torpedo has doors that extend into the top for easier getting in and out. Brakes are of an automatically adjusting type developed originally for racing cars. A new engine can be installed in 15 minutes when necessary

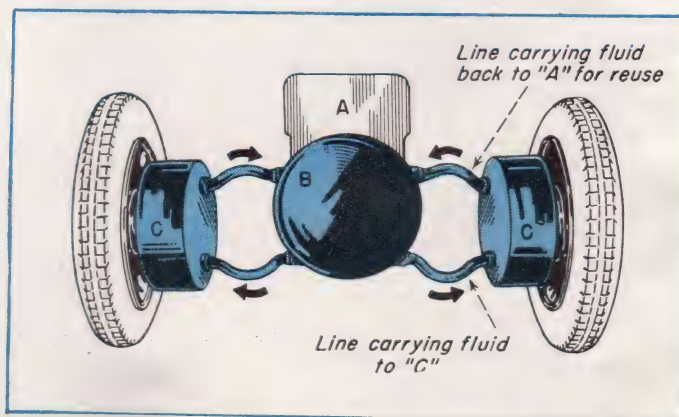


Engine in rear, all-hydraulic drive
make the Tucker a real car of the future

MORE like a Buck Rogers Special than the automobiles we know today, the Tucker Torpedo is scheduled to hit the road sometime in '47. If all goes according to plan, this startling car will incorporate a series of spectacular engineering innovations that conservative auto manufacturers have classified as "at least five or six years off."

Here are some of the highlights of this 126-inch wheel-base vehicle in its present design:

Hydraulic torque converters provide a direct power-transmitting system that does away with the customary clutch, transmission, drive shaft, differential, and rear axle. That eliminates about 800 working parts and saves



OPERATION of car's hydraulic drive is shown in diagram above. Fluid in reservoir (A) flows to pump (B) driven by car's engine. Pump forces fluid through flexible pipes to hydraulic motors (C), which drive rear wheels. Fluid then returns to reservoir for re-use.

800 pounds, so the Torpedo will weigh about two-thirds as much as other automobiles of comparable size and power. Its engine will be mounted in the rear.

This type of power train permits individual wheel suspension on all four wheels. Along with that are front fenders mounted so that they turn with the wheels. Headlights set in the fenders will always point in the direction the car is traveling, an important safety feature for night driving.

Other features designed for providing safer transportation are a body and chassis made as an integral unit, with welded steel tubing used for strength and lightness. Fenders and the one-piece top are of steel, and a crash panel in front of the driver's seat is lined with a two-inch layer of sponge rubber.

Built for high speeds

The man responsible for this creation is no newcomer to the automotive field. Preston Tucker, head of the recently formed corporation that plans to manufacture the Torpedo, has worked for some time at designing and building racing cars. Perhaps because of this background, the new car is built

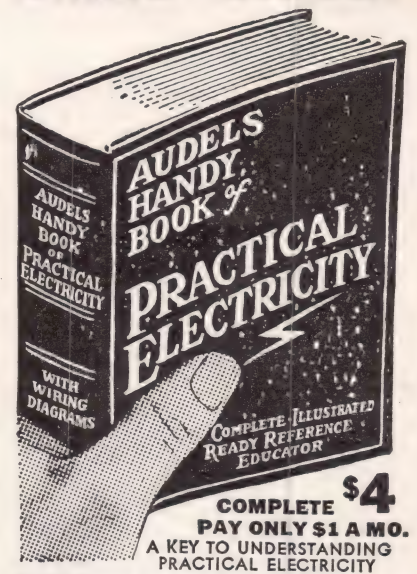
for speeds far above anything you can do with comfort on most highways. A sustained cruising speed of 100 miles per hour is claimed for the car, with a much higher top speed.

Power for such speeds comes from a 150-horsepower, horizontally opposed six-cylinder engine with fuel injection instead of standard carburetion. Cylinders are of fused bronze with the same coefficient of expansion as the aluminum pistons. Tucker claims this insures a closer fit for the pistons and reduces engine wear.

Doors of the Torpedo open out and upward to clear curbs when the car is parked, and they extend into the roof so that passengers can get in and out without stooping. Two luggage compartments are provided, one in front and the other over the engine in the rear.

To skeptics who claim that the Torpedo is too fantastic to see the light of day, Tucker boosters point out that the company already has acquired a \$170,000,000 former bomber plant in Chicago and that tooling for production is already under way. And they say the Torpedo won't be a millionaire's chariot but will sell in the medium-price field. (END)

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LIGHTWEIGHT LOG LOADER

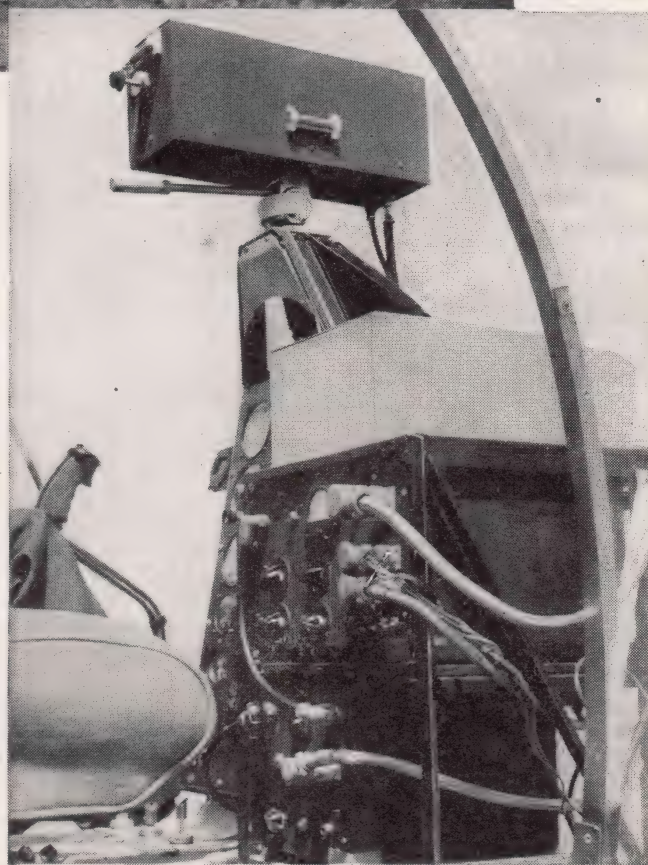
Weighing less than 1,000 pounds, an aluminum pulpwood loader can be mounted on the under side of a truck bed for quick loading at pickup points. Its conveyor lifts logs and deposits them on top of the truck load. The loader also can be used on its own supports at stockpiles, and is pushed back upon its skids as the supply of logs diminishes.



OVER CANADIAN WASTE hovers Dr. Lundberg's helicopter. When magnetometer shows presence of mineral, craft mounts upward, instrument gauges depth of the deposit by registering magnetic variations.

PROSPECTING with Helicopter and Magnetics

IN JULY, SCIENCE ILLUSTRATED reported that U. S. geologists were speeding the search for mineral and oil deposits by using helicopters and color photography. Last month, it told how the Navy is prospecting for oil in Alaska through aid of planes carrying the "flying doodlebug," a form of magnetometer. Now comes the report of how the Lundberg-Ryan Air Exploration Co. of Toronto has mounted Dr. Hans Lundberg's magnetic-electronic equipment in helicopters, and thus has his version of the magnetometer hovering over the promising mineral regions of Sudbury, northern Ontario. (Lundberg notes that helicopters can go to inaccessible points, skim the ground, and hover over a spot when the recorder indicates a worth-while discovery.) Geologists call the new use of the airborne magnetometer the outstanding advance in their field for 1946.



LOCATOR OF MINERAL WEALTH, mounted inside the plastic nose of helicopter, picks up variations in the magnetic field over a mineral deposit. They coincide with the variations in the deposit itself. Sensitive pickup equipment is at top of instrument. Below it are distributor, amplifier, and recorder. Latter gives direct readings that simplify recordings on maps.



SILICONES

a New World of Products

Photos by Larry Kean

WARM, THEY BOTH POUR; silicone oil (right) and ordinary oil flow easily. First step of comparative test pictured here was made at normal room temperature of 68 degrees.

New protectives — for your autos, houses, clothing, and even eyeglasses— come from this new series of chemicals

SILICA is the basic part of most rocks, of sand, and of glass—solid, inactive, unchanging. But suddenly it has been engineered into a whole world of new chemicals and products, the silicones that are now reaching the market. Among these are plastics, resins, lacquers, paint, oils, insulation, and rubber: a wide variety of solids, liquids, and even gases.

Today the chemical engineer is mass-producing what was a laboratory curiosity yesterday. Dow Corning's big silicone plant at Midland, Michigan, has been in production since 1944; General Electric's new silicone factory at Waterford, New York, is nearing completion; other plants will arise.

You've met the carbon compounds

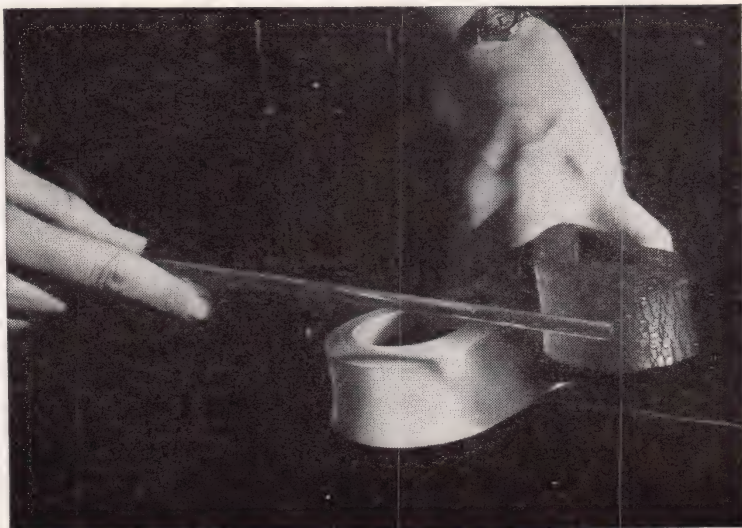
To understand the new silicone treasure, one needs to look at carbon—also a solid element (diamonds, coke, graphite). Carbon long has been converted into thousands of compounds, that are called organic, because it was once thought they could be made only by the organs of plants and animals. Among these organic compounds are alcohols and acids, dyes and perfumes, oils and fuels and food. About 1900, Prof. F. S. Kipping of the University of Nottingham, England, worked at making a similar series of compounds from carbon's sister element, silicon. He succeeded, but on a small scale. Now, thanks to recent research, Dr. Kipping's curious compounds are the large-scale products called silicones.

The silicone compounds have this in common: They are made from sand; they are not easily combustible; they are water-repellent; their properties are little affected by temperature changes.

Thus, for example, silicone rubber is almost as elastic at far below zero as in sizzling heat; and silicone lubricants care nothing about weather or altitude. Despite their high heat-resistance, sili-



COLD, IT'S A DIFFERENT STORY. Ordinary oil (left) has congealed at below freezing, while the silicone oil still flows. The silicones retain their characteristics despite wide variations in the temperature.

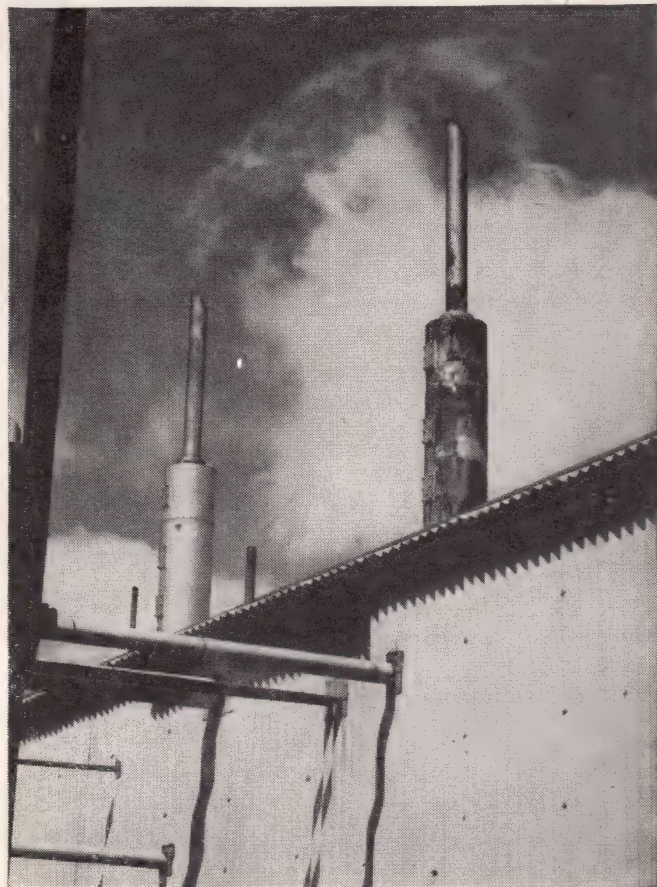


HEATED SILICONE RUBBER retains original appearance and characteristics. Not so the regular rubber (right), which looks crusty and is crisscrossed by deep cracks after both products are exposed to same high heat.



Dow Corning

WET MOTOR won't stall when outboard has been treated with DC 4, a silicone compound used to seal ignition systems of warplanes. Here water is poured over plugs, but motor hums along.



TOUGH PAINT comes from silicones. Diesel muffler at the left was painted with a silicone aluminum paint on same day that now-rusted muffler at right was treated with ordinary aluminum paint.

cones can be fabricated with the same methods and equipment that are used in making organic plastics of the conventional type.

Many of the consumer uses foreseen for silicones are inherent in their water-repelling characteristics. Windows and windshields will shed water and stay clean longer after polishing with silicone fluid; shoes and other leather goods can be easily waterproofed; treatment of clothing promises to eliminate frequent trips to the tailor for pressing and cleaning. Silicone-treated paper raincoats, for sale like hot dogs at outdoor events, would be so cheap they could be used once and discarded.

Trout flies dipped into silicone fluid rest lightly on the surface of a stream indefinitely. Already on the market is a silicone fluid that keeps eyeglass lenses clean for a week at a stretch. The fluid leaves a coating that protects them from scratches and dirt, doesn't interfere with refraction, and improves vision.

An end to car polishing

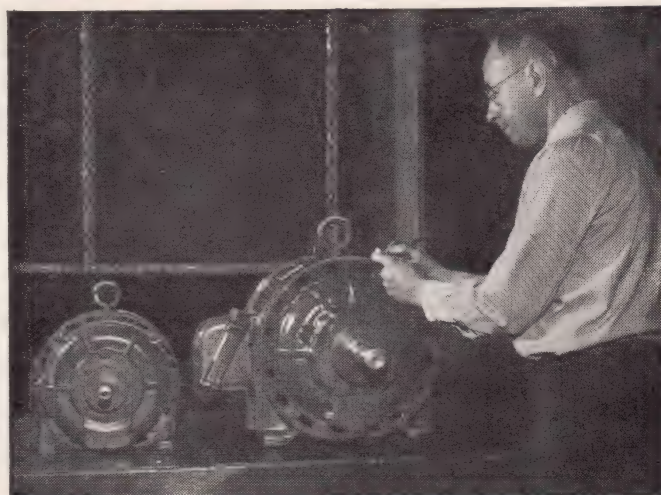
Shower curtains, tents and awnings, upholstery, and even bricks and mortar are coming up for waterproofing with silicones; and waterproofing usually means stainproofing. Outboard motors have been waterproofed successfully with DC 4, a silicone compound that sealed ignition systems of military aircraft and helped to keep the B-29's flying over Japan.

A silicone resin paint, announced by General Electric, promises lifetime finishes for automobiles that will end forever the chore of car polishing. Silicone-painted panels exposed to all sorts of weather for three years are still bright. Used on refrigerators, stoves, and hospital equipment, the paint will prevent discoloration and damage from hot greases and chemicals.

Dow Corning and Westinghouse, co-operating in tests of silicone insulation for electric motors, made one motor that ran 4,504 hours at 310 degrees, the equivalent of 3,000 years of running at normal temperatures for present motors. The tests show that silicones have raised the operating temperatures of electrical equipment by 100 degrees. And that's only a beginning.

Though new silicones are being developed, and established silicone products are being improved, it will take years to explore just the most useful of the silica components already known. The laboratory engineering of the silicones may one day prove as universally important as the chance discovery of glass.

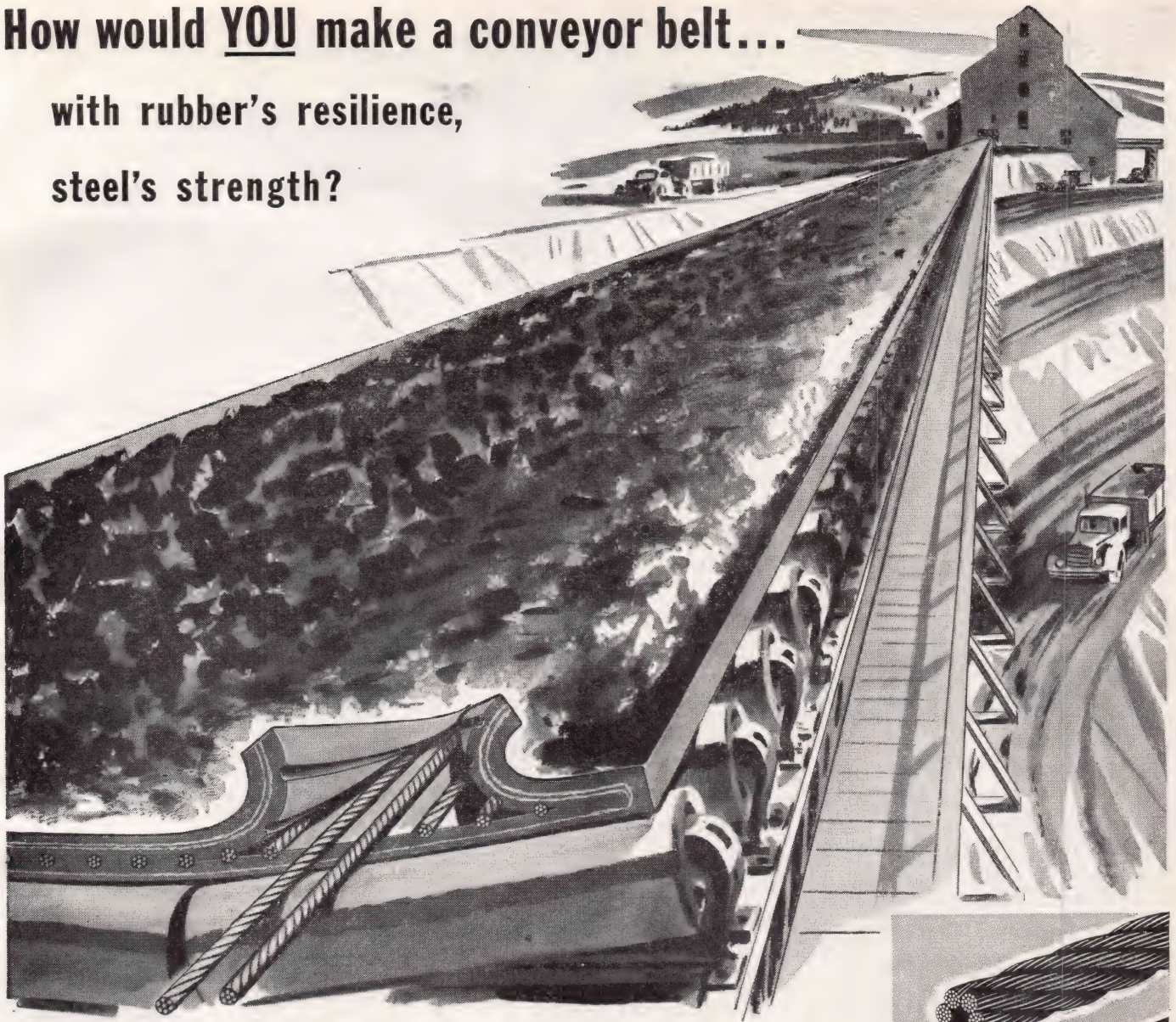
Westinghouse



SAME HORSEPOWER. The small electric motor isn't outdone by its big brother; each produces 10 horsepower. Silicone insulation enables smaller one to withstand far higher temperatures.

How would YOU make a conveyor belt...

with rubber's resilience,
steel's strength?



One serious limitation to the lift and length of a conveyor has always been the limited strength of the belt. Gaining strength by increasing thickness meant large and impractical pulleys. But at last there is an answer.

Today, conveyor belts are being made six times as long, for six times the lift and haulage. Small cords of Roebling wire rope, known as Steelply, are embedded in the belts, actually combining the resilience of

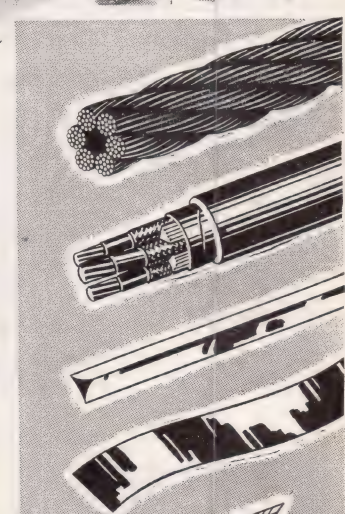
rubber with the strength of steel.

Here is an instance where Roebling engineers worked with the engineers of leading rubber companies to produce a new and far better product. They will welcome working with *your* engineering department on matters involving the use of any Roebling product.

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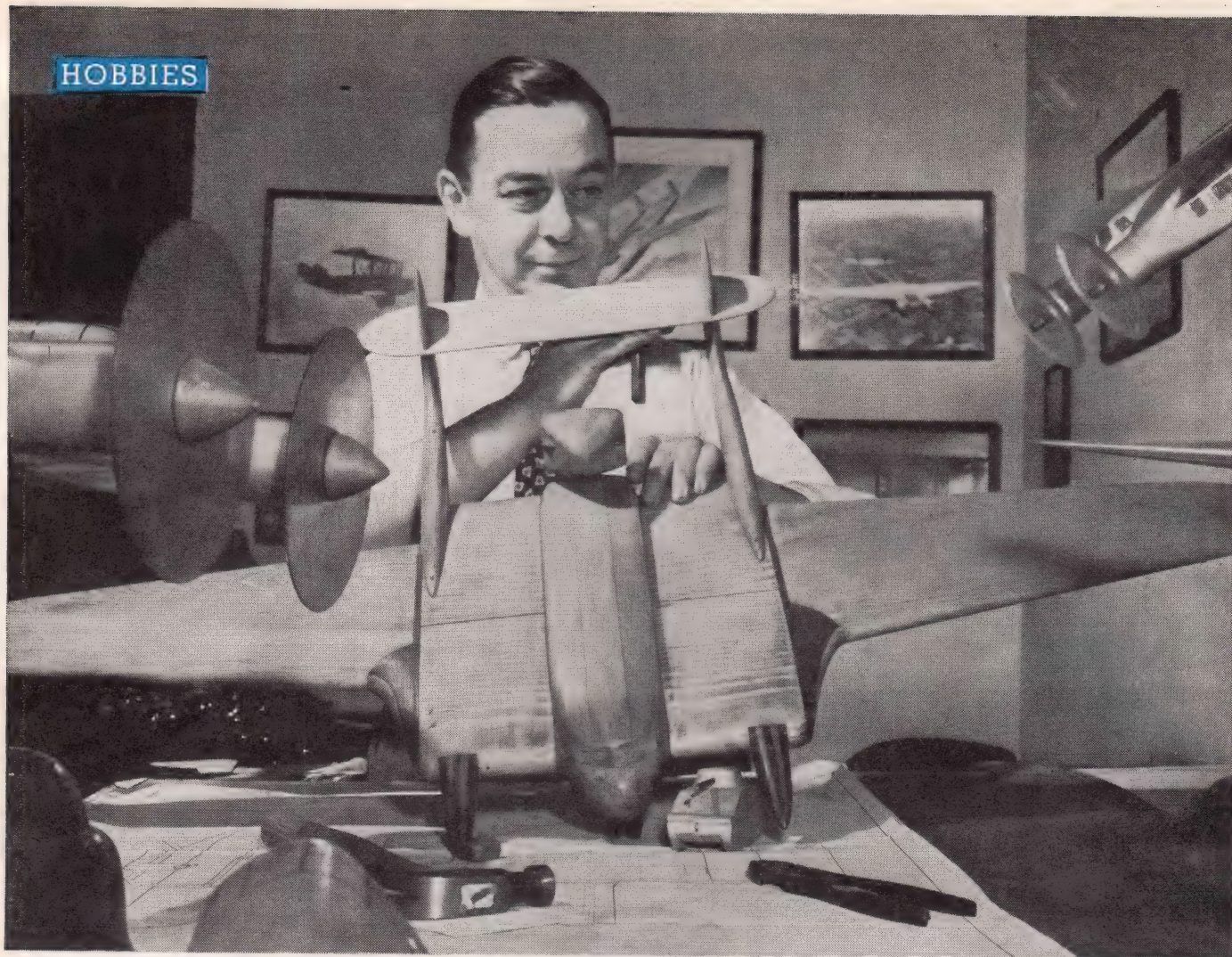


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ROEBLING

PACEMAKER IN WIRE PRODUCTS





Vincent Burnelli at work on a wooden model of an air freighter designed to carry a Sherman tank.

Safe Models Make Safe Planes

Burnelli, a pioneer in designing flying wings, takes model making seriously

"I'M A hobbyist and glad of it," says Vincent Burnelli, president of Central Aircraft Corporation and pioneer in the lifting-fuselage type of aircraft. His hobby is making model airplanes. He began making them 30 years ago as one of the charter members of the far-famed New York Model Aero Club; he is still making them today so that he can be sure that safety is being built into his company's airliners.

From his early model making, Burnelli quickly advanced to building and flying full-size gliders. The next step was building powered planes on his own. That was followed by building Moissant monoplanes—in a converted Long Island coffin factory. By 1918, Burnelli had supervised construction of one of the world's first passenger airliners. He still

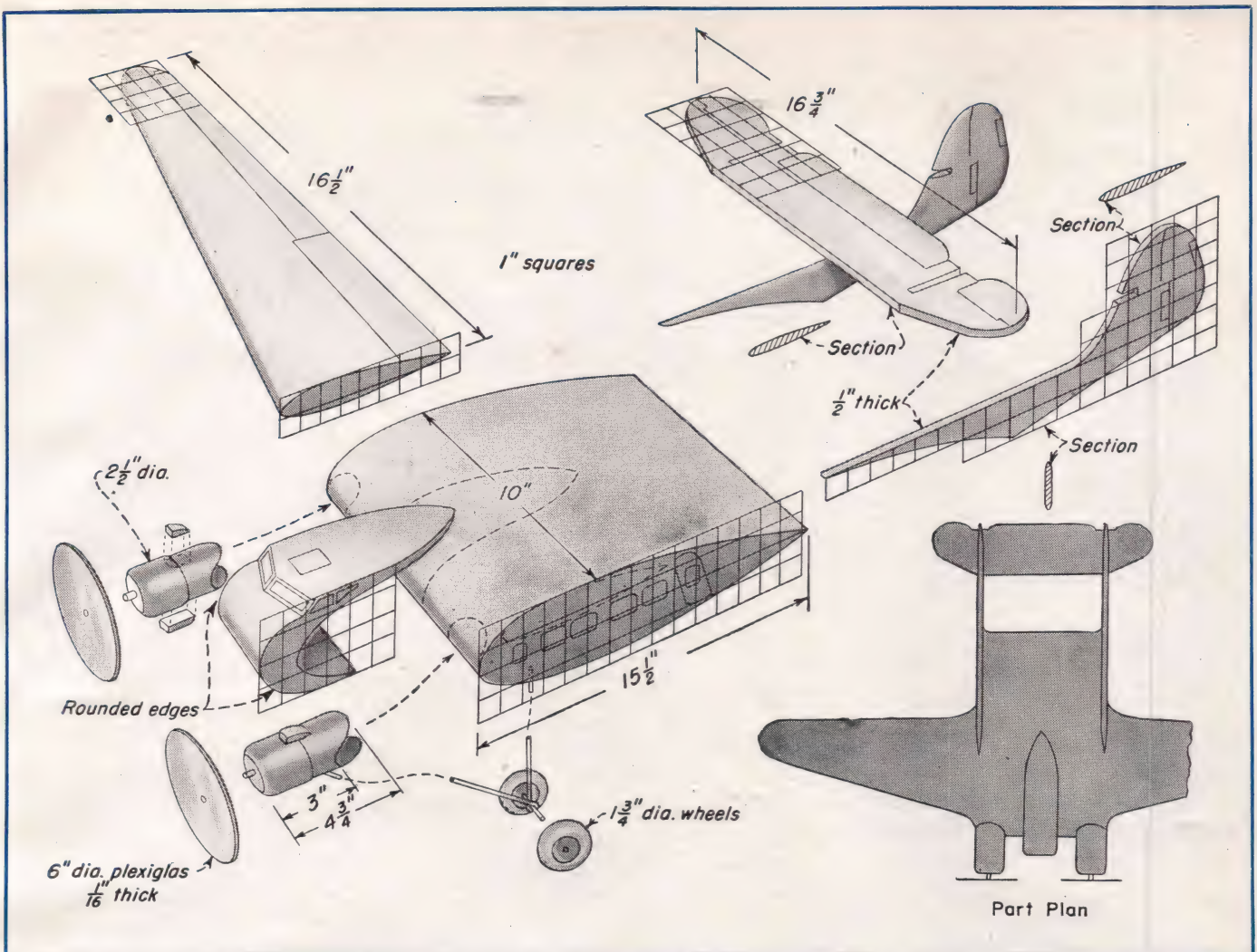
built model planes, but now model making had become a major part of his business.

"Wind tunnels were rare in those days," he recounts, "but there was one way to get advance information on the qualities of a new design; you could make a flying model and see what that model would do." He followed that procedure in producing the lifting-fuselage design (patented) that has made him so well known in aeronautical engineering circles. His first model of that type, like its present giant counterparts, derived most of its lift from the airfoiled fuselage; it could even fly without wings.

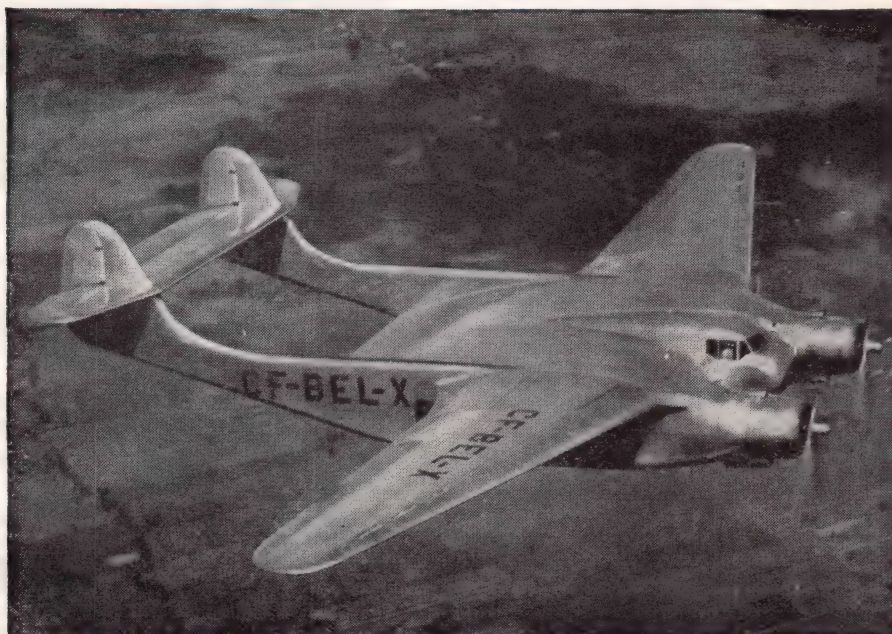
Unscheduled test of toughness

"But making the body of a plane lift a part of the load wasn't the only thing the design accomplished," says Burnelli.

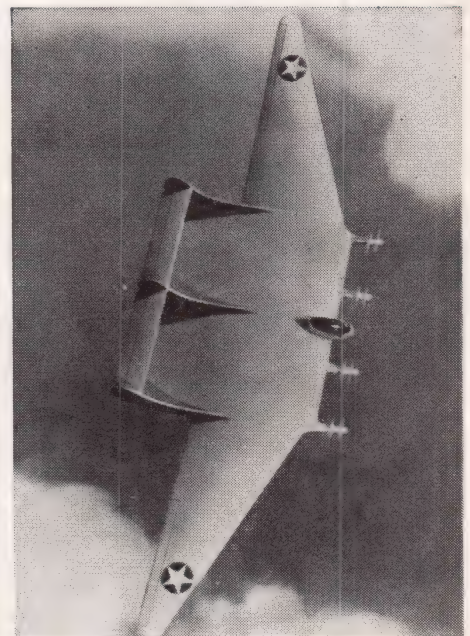
"The broad, flat body could be built like a tank, and it could really take it when those old-time engines let you down for a crash landing." A mechanic's negligence a few years ago quite conclusively demonstrated the ruggedness of Burnelli-designed aircraft. (Continued on page 88)



TRY IT YOURSELF. This drawing will help you build a model of ship shown at left below.



PASSENGER-FREIGHT SHIP, designed by Burnelli, is now in production at Canadian Car & Foundry Co. These lifting-fuselage CBY's can be adapted to shed their wings if forced down at sea. They would then ride out storms and reach port as surface craft, using auxiliary engine and water propeller while passengers ride in comfort.

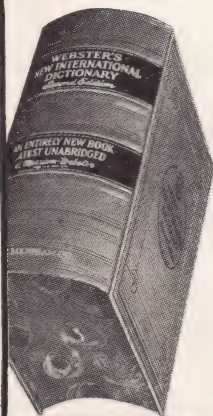


FOR 120 PASSENGERS. Now in the engineering stage, this one is powered by eight engines in dual units driving counter-rotating propellers. Total horsepower, 16,000.

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WHAT I WANT NEXT

Put the inventors and engineers on the spot!

Tell them about that dream product you wish you could buy

WALTER B. PITKIN, author (Life Begins at Forty) and psychologist, recently made a random one-man survey to find out what people wanted most from the scientists, engineers, and inventors. Here are some of the answers he got from men and women in various walks of life.

Bedclothes, including blankets, of some plastic fiber, that I can clean simply



by hanging them out and turning the hose on them, then leaving them to drip for a few minutes. No more troublesome washing and drying!

A thunderstorm tuner-outer—a device I can turn on so that I will be unable to hear the thunder or see the lightning. And don't tell me to put a black hood over my head! I want something really scientific!

Good-looking shoes with a surface that repels dirt and water so that a



light kick will knock off the dirt, while the water will dry off without leaving stains or cracking and stiffening the material. People spend altogether too much time keeping their shoes neat.

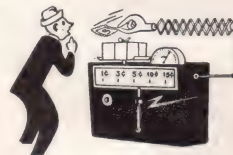
A pocket notebook I can use forever. It must have many pages, so each sheet must be very thin—say, like air-mail letter paper. I must be able to wash each page clean instantly with a damp cloth and use it over and over. Won't some chemist invent the right plastic?

A light paint sprayer and sander that I can use to do painting jobs around my home. For many of these, I can't call in a professional painter. The small jobs would not be worth his while, and on the larger jobs I can't pay him the

wages he demands. A paintbrush is as out-of-date as last year's calendar. Most paint sprays are too big and too heavy. Surely a clever man can devise one that any little woman like me can use easily.

Distinctive bottles for poisons. They should be unlike all other bottles in both shape and color. People will reach for bottles in the dark, when they are only half awake, or in absent-minded fashion. We had one such accident in our family, and I never want another. This one is easy. It shouldn't take an Einstein to figure out what to do and it would save a lot of suffering every year.

Post-office vending machines that will automatically sell stamps, weigh and



stamp packages, and register letters. I'm tired of standing in line at post offices!

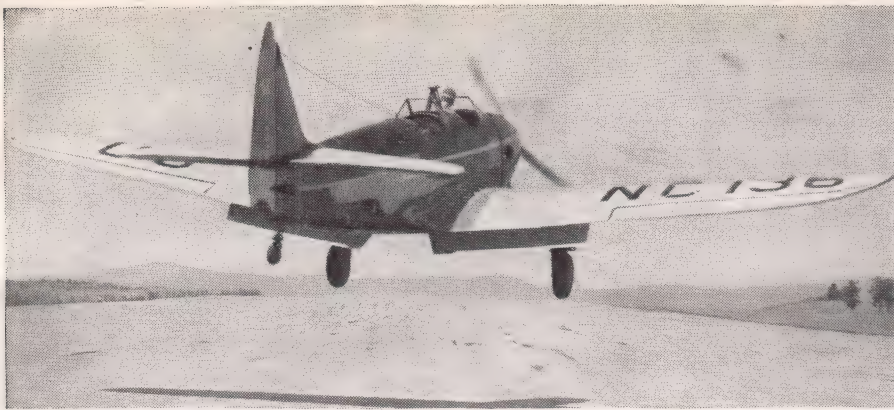
A lawn mower and hedge clippers that I will never have to clean. Might as well make them self-oiling, too.

Reversible suits like those the best London tailors have been making for years. I had one once. As it wore shiny, my London tailor ripped the seams apart and reversed each piece. I



had a new suit—as good as the original for six years! Why can't American tailors do this?

What do YOU want next? **SCIENCE ILLUSTRATED** will pay \$10 for every suggestion published. Send them to What I Want Next, **SCIENCE ILLUSTRATED**, 330 West 42nd Street, New York 18, N. Y. None will be returned.



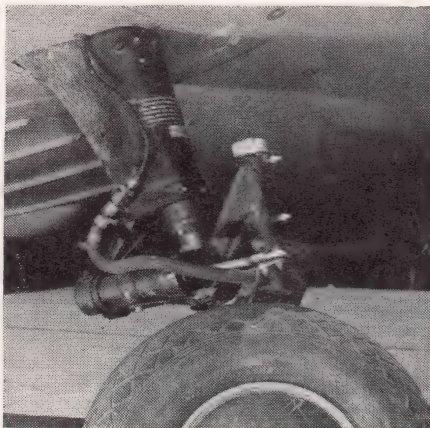
SWIVELED WHEELS on this Fairchild PT-19 trainer allow the plane to travel sideways along a runway, keeping its head into the wind regardless of direction. Small planes so equipped could take off and land on highways or single-runway landing fields.

Landing Across the Wind

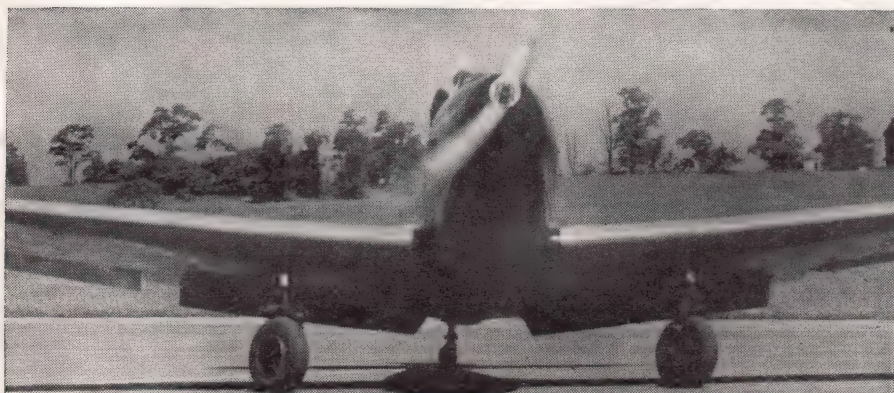
CROSS-WIND landings are now taboo for most small-plane pilots, because there's too much danger of ground-looping. But in the future such landings will be safe and simple if a research program sponsored by the Civil Aeronautics Administration works out satisfactorily.

Planned with an eye to giving personal-plane flyers more time in the air and making possible more and cheaper airports, experiments are now under way to see what can be done by swiveling or "castering" the main wheels of small-plane landing gear. The goal is to permit a plane to come down on a runway crab-fashion when necessary and travel obliquely on the ground. The same procedure could be used in cross-wind take-offs. This would allow a pilot to keep his plane headed in a proper direction with respect to the wind, while the castered wheels would enable the plane to follow the runway.

A single runway would be sufficient for a small airport if planes had this type of landing gear. Where more runways are available, several of them could be used at the same time.



CLOSE-UP of cross-wind landing gear. The present problem is to make the mechanism light and cheap for all small planes.



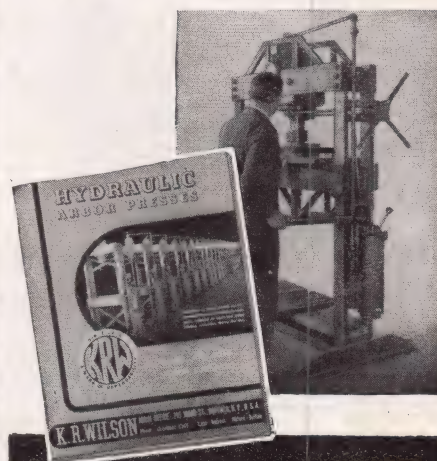
HOW IT WORKS. Early cross-wind landing gear showed a tendency to "shimmy" when the plane taxied at slow speeds. That was licked by changing the caster angle, but more work must be done to fit planes with wheels that swivel like the casters on furniture.

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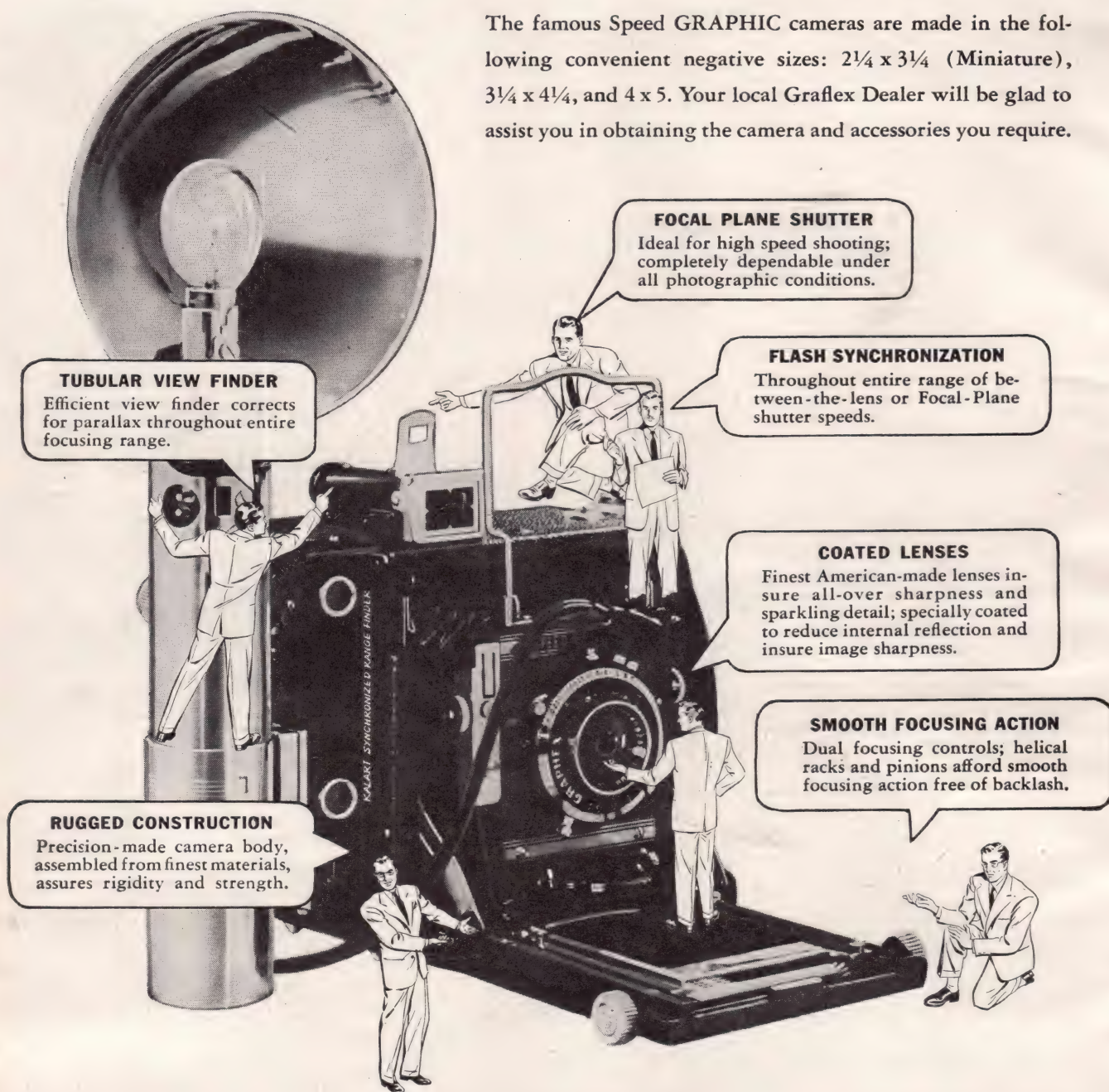
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A DUCK TAKES OFF

Rare photos of a mallard, taken by businessman
Edgar Monsanto Queeny, permit flight analysis



AT EXTREME TOP OF UP BEAT, just before power stroke begins, duck's wing tips almost touch. Feet go forward to balance. Queeny, board chairman of Monsanto Chemical Co., in five years of spare time made 60,000 photo negatives of ducks in action.



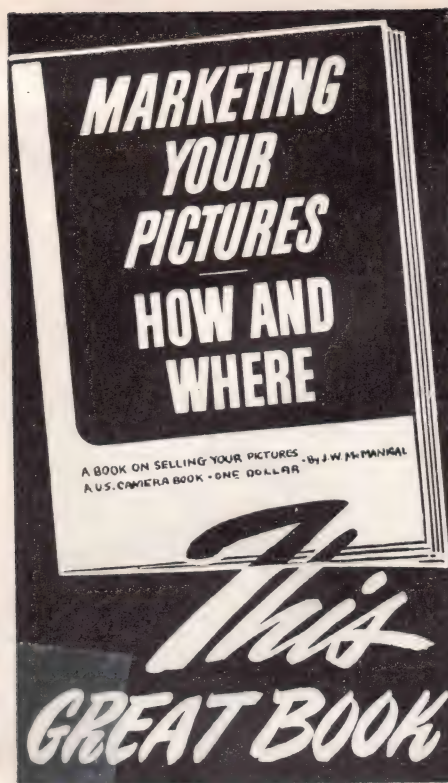
HALFWAY THROUGH DOWN BEAT, the leading edges of wings are depressed, the feet are swung back. Ducks have to make occasional crash landings when air currents upset their courses. They do Immelmann turns, roll over, peel off from mass flights.



AT EXTREME BOTTOM OF DOWN BEAT, or power stroke, the wing tips again almost touch. Feet are retracted far back, in same position they occupy when duck is in full flight. Ducks' tails serve as air brakes; during flight their feet are rudders.



HALFWAY THROUGH UP BEAT, feet are forward and tail is depressed. Wing feathers are airfoiled for the upward thrust. Queeny used telelenses, swung the camera from a tree. His "Prairie Wings," published by Ducks Unlimited, has 276 photos.



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Ektachrome... How to Process It



Now you can see your color photos the same day you take them, because you can develop Ektachrome film yourself. All necessary chemicals are included in kits for various quantities of developer. The processing requires less than 90 minutes.

Initial development takes only 15 minutes. A one-minute rinse follows, then five minutes in the hardener. After three minutes of hardening the lights may be turned on for all the remaining steps.

"Reversal exposure" is accomplished by holding the film a foot from a small floodlight for five seconds' exposure on each side. A five-minute wash is the next step, then a 25-minute color development, and five minutes in the clearing and fixing bath. Ten minutes' washing and a minute in Kodak Photo-Flo solution to reduce the chance of water spots completes the work. But the image is still hard to see. It acquires brilliance as the film dries.



NO SPECIAL EQUIPMENT is needed for the new color film. Sufficient are ordinary studio lights and gear like that shown in the upper photo taken in the studio where color pictures on page 56 were made. Film should be dried in frame, as above, in cool air. Emulsion damages while soft.



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WHAT'S UP? The intent reader on the sofa knows there's something in the air, but he seems unconcerned about his apparent danger. The shot was taken from a stepladder, with the subjects arranged on the floor. Expert cropping removes any clue to the deception.

DEFYING GRAVITY

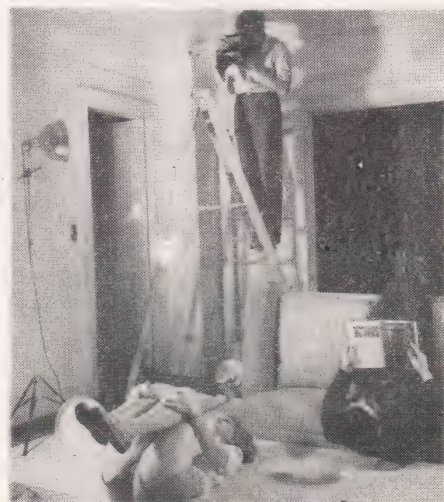
Laws of nature seldom hamper the expert photographer. From his bag of tricks he can pull setups to make water run uphill, or picture the sun shining blithely on an eerie midnight scene. Not the least interesting are arrangements for defying gravity, with results like those seen in the picture above.

Trick photography offers broad scope to the ingenuity of both professional and amateur. Acrobatic stunts, dancing leaps, and feats of strength that stagger the imagination can be shown so realistically that credulity is strained to the utmost, with never a clue to how it was done.

It's all in the props. An example is a picture of a child lifting a grand piano with one finger. This calls for careful arranging of furniture on wallpaper as in the "levitation" shot above, with the child standing on a chair turned on its side. The background conveys the impression that the piano is in the air with the wall in the background. With a few variations, you can even make subjects walk on the ceiling.

This method is also valuable in color photography when it is desired to take

an "action" shot despite the relative slowness of color film. A simulated background, which will be convincing when cropped, makes it possible to pose "action" scenes that will call forth exclamations of wonder when you show the prints.



PROPS for this living-room setup were a stepladder and a roll of wallpaper. Lamp and pictures were placed on the floor. The angle of camera shot determines realism.



Portable Bar Serves as Compact Darkroom

No need to park photographic accessories and chemicals all over the house. This cabinet opens to form a completely equipped darkroom with ample working space. Locked, it keeps children from getting into the chemicals.



Brighter Projection with Coated Lenses

An increase of as much as 33 to 50 percent in the brilliance of slide and 16-mm. movie-film projection is obtained with the use of Lumenized lenses, the Eastman Kodak Company reports. The company is equipping many of its new projectors with these lenses, which have a microscopically thin layer of magnesium fluoride.

The function of the coating is to decrease the amount of light reflected by the glass surface, with a resulting increase in transmission. Thus, where there are as many as 8 to 14 glass-air surfaces—as in most Kodak projectors—coating of lenses is of major importance and promises to become even more advantageous in the field of projection than it has proved to be in picture-making. The Lumenizing technique produces permanently bonded coatings which are so tough that they can withstand soaking in salt water for several days and will not rupture when rubbed moderately hard with steel wool.



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1. **RADIOING COLOR PHOTOS**
The story of how the first published radio color photo brought late Paris fashions to New York in 12 hours. Illustrated in full color.
2. **PINERO OF PUERTO RICO**
The new native Governor of Puerto Rico is an ace cameraman. Two pages of outstanding island scenes.
3. **MODELS ON THE BEACH**
A quick trip back to the seashore with a bevy of beautiful Barbizon bathing gals.
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5. **CHRISTMAS GIFT SECTION**
A "catalog" of the things photographers are looking for to bring more pleasure and greater perfection to their work.
6. **POET'S CAMERA**
Look into the book that settles for all-time the question: "Is Photography Art?"
7. **PHOTO CONTEST WINNERS**
Prize pictures from the Graflex All-American Competition for \$5,000.
8. **BLIZZARD!**
Jack Frost sets the snow scene for unusual shots snapped after the heaviest snowfall New York State saw in a decade.

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1. Simplified Color Photo Course
2. With The Critic
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6. Money Making Ideas
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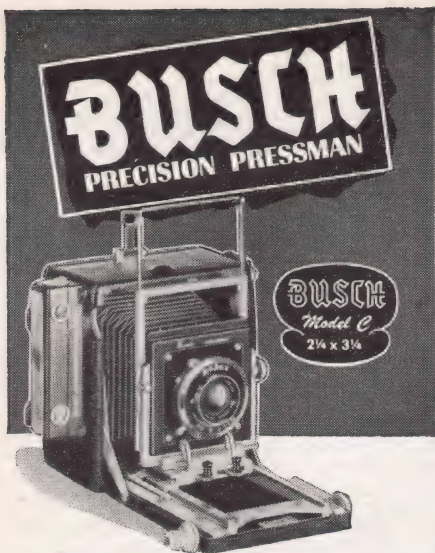
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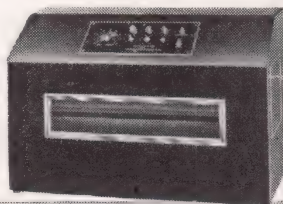
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nary electric light, permitting photo-copies
of letters, drawings, etc. to be made right in
office or drafting room.

Model C, rotary printer, makes copies up
to 18" wide of any length. It will make:

- Duplicates of letters and manuscripts
- Black line reproductions on paper, transpar-
ent Vellum or cloth from pencil originals
- Copies from blueprints or yellowed originals
- Reflexed negatives from opaque or two-sided
originals

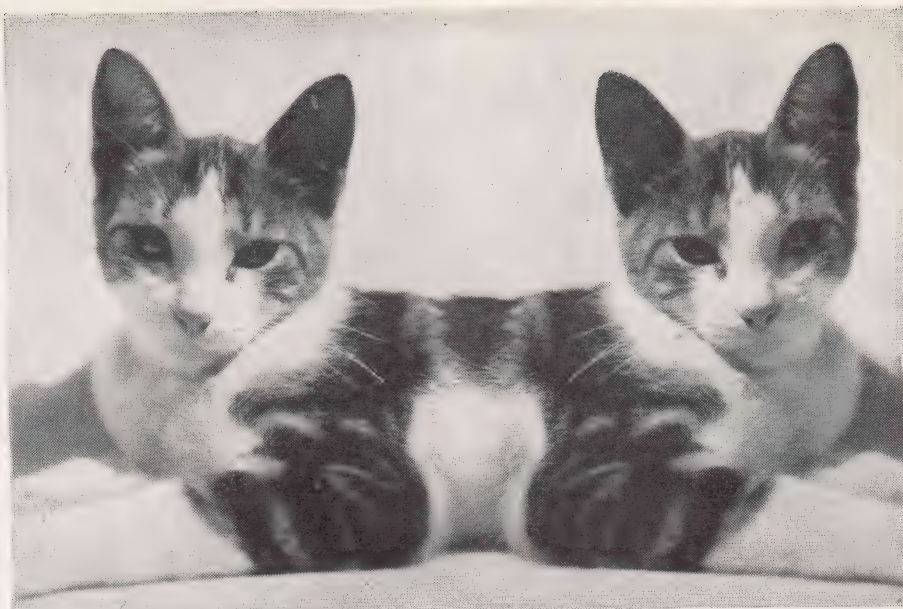
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information
write for
Bulletin 12-J



**PEERLESS
PHOTO-ARC PRINTER**

Made exclusively by

PEERLESS PHOTO PRODUCTS, INC.
50 Broadway, New York 4, N. Y.



JOINED AT THE MIDRIFT, the pleasant kitten is a product of double photo printing.
Careful cutting and reversing of the negative produced smooth joining of the two images.

Free Lance

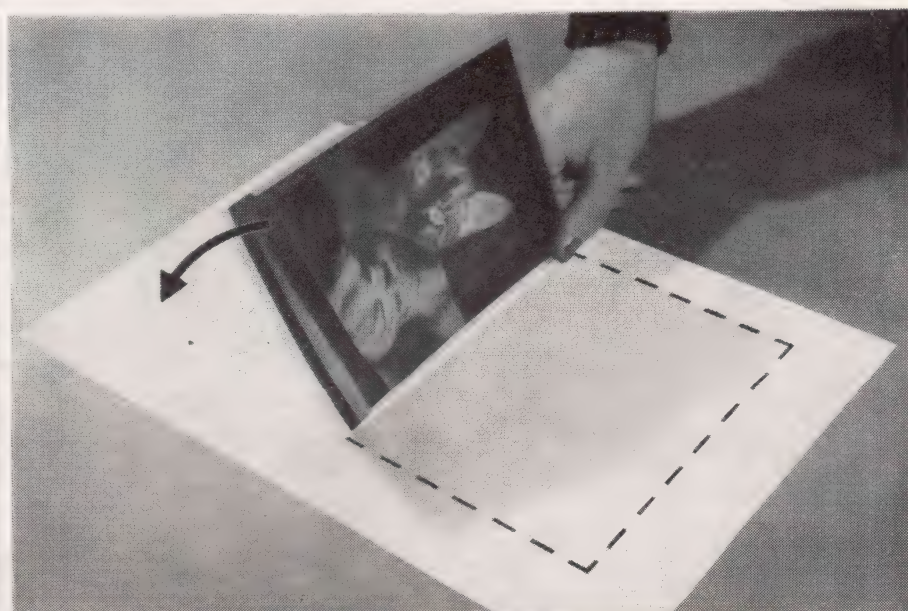
SIAMESE TWINS?

Strange and interesting twin
subjects of many kinds have
their source in the darkroom

FOUR-FINGERED hands with a thumb
at each side . . . automobiles that
seem to be going in both directions . . .
bridges spanning streams with iden-
tical banks . . . women's hats that might

set a new style. Those are just a few
of the unlimited number of effects—
some charming, others fascinating
by their freakishness—that can be
achieved in your darkroom by exer-
cising your ingenuity and flipping
your negative.

The photo below is the giveaway.
In making the flip, the cut edge of
negative is kept in contact with the
print paper to assure alignment.



TRY IT YOURSELF. The dotted line marks the area of your first print of subject to
be made into twins; cover it when negative is flipped over to make the second print.

RAINMAKING



UMBRELLA is only a prop in this fair-weather picture. Rain is dubbed in later.



WATER sprinkling in bathroom shower is photographed against a black background.



STORMY WEATHER results when the negative of the girl with the umbrella is printed simultaneously with that of the shower picture. A similar effect can be obtained by using a clean-washed negative or plate of glass, uniformly streaked with dabs of color.

You don't have to go out into a storm to get convincing pictures with rain or snow. The same effects can be produced by mechanical means if you keep the psychological factors in mind. For the composite picture above, the umbrella helps to put across the idea of rain. Snow, simulated by particles of sugar or heaps of soap dust on a glass plate, can be supported by such props as skis or a part of a sleigh. Just as sound effects heighten drama in the theater, background details confirm the illusion created by a photograph of this kind.



MAKE IT SNOW by spreading grains of sugar with a brush on a clean glass plate.



*Make sure they're Better...
get the new, improved*

G-E

exposure meter

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Federal tax included



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The patent laws provide that any new and useful art, machine, article of manufacture, composition of matter, or design, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the patent laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of 17 years.

The patent laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent in order to comply with the requirements of the U. S. Patent Office. For that reason, the Patent Office advises the inventor to engage a competent registered patent attorney to prepare his application for patent and represent him before the U. S. Patent Office Examiner.

A specially prepared booklet containing detailed information with respect to patent protection and procedure will be forwarded to you without obligation upon request.

CLARENCE A. O'BRIEN & HARVEY B. JACOBSON

Registered Patent Attorneys

66-M Adams Building, Washington 4, D. C.

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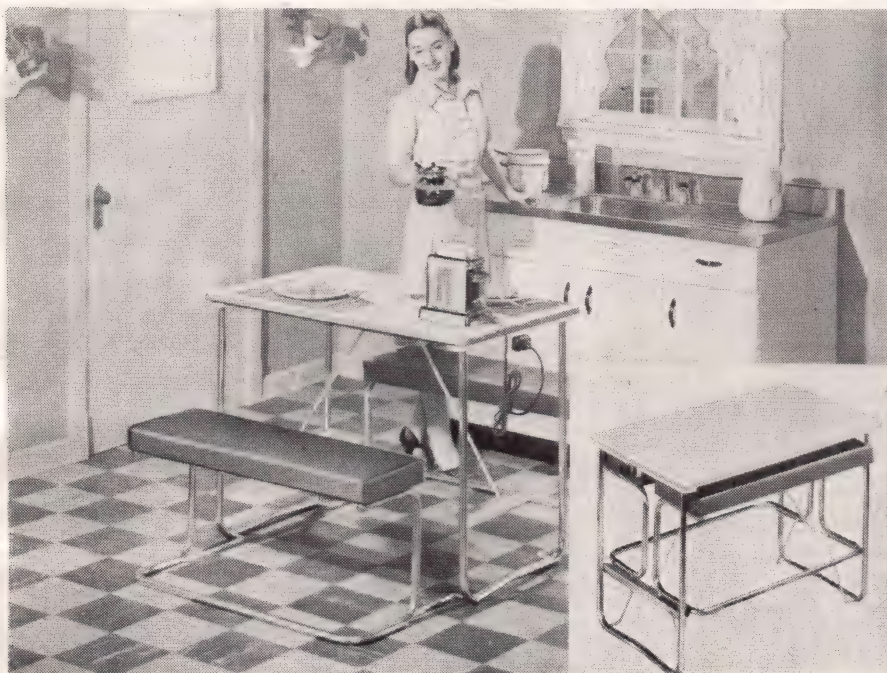
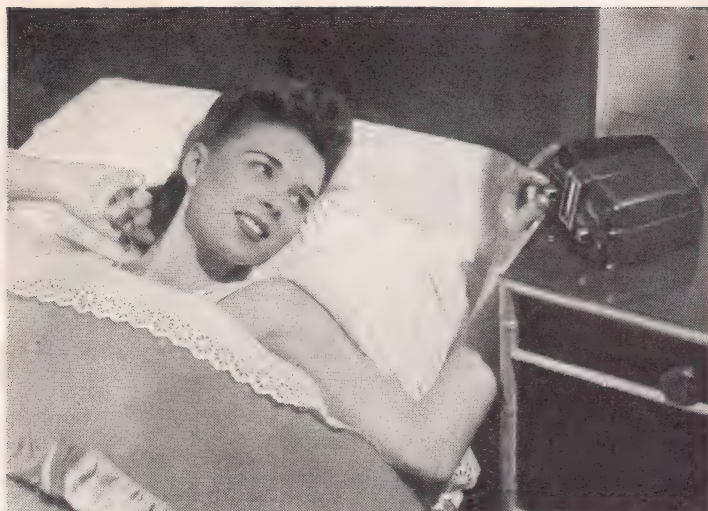
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& HARVEY B. JACOBSON**

66-M Adams Building + Washington 4, D. C.

WHAT'S NEW

NEVER A COLD BED

Electronically controlled and electrically heated, this new Simmons Company blanket prewarms the bed and keeps users at an even level of their desired amount of warmth. The user sets the bedside control and electronic tubes automatically compensate for changes of body and room temperatures. There are no icy spots left around the edges. Distribution is through department and furniture stores.



CONVERTIBLE DINETTE SET FOR SMALL HOMES

One minute it's a kitchen table; the next it's a dinette set with two upholstered benches seating four persons. Thus the "J. C. Higgins Nook" serves double duty for the compact home. Table, 25 by 40 inches, has a porcelain top. Tubular legs are chrome-plated steel. Built in is a dual electric outlet necessitating but one cord to the wall. Made by Ideal Steel Co., 666 Lake Shore Drive, Chicago.

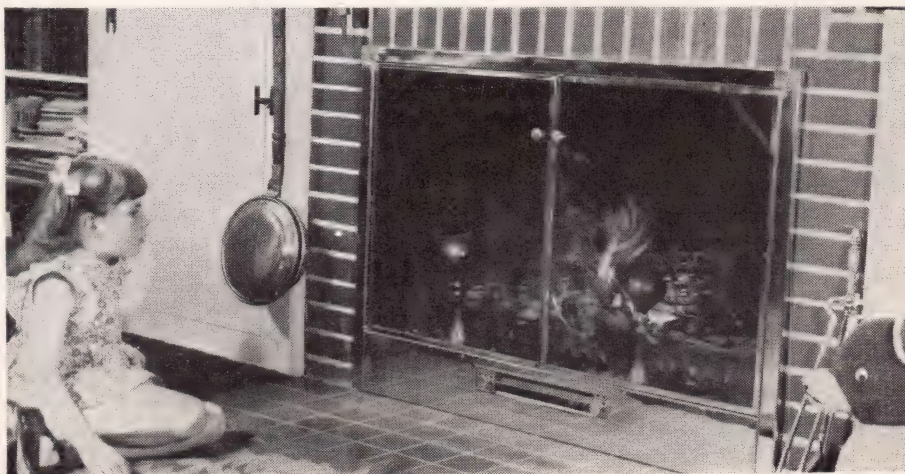


HALF OF A BINOCULAR

This monocular is only half of a double-barreled optical glass. And that, says the maker (Sportscope, 2753 Lombard Street, San Francisco) is why it is half the weight, half the price of a binocular.

GLASS FIRE SCREEN REGULATES BLAZE, SAVES FUEL

The unbreakable glass panels of this fireplace screen permit a high degree of heat penetration and at the same time keep smoke, fumes, and sparks from entering the room. The glass will withstand 650 degrees heat. Two small, adjustable draft doors concentrate a current of air on the fuel. Screen is said to prevent the escape of room heat up the chimney and therefore is a fuel saver. Brass-finished frame of the screen is air-cooled. An air baffle keeps inside of glass clean. May be used for wood, coal, or gas fireplaces. Comes in ten standard sizes. The Thermo-Lite Glass Fireplace Screen is made by Galanot Products Co., Alliance, Ohio.



PATENT PROTECTION FOR INVENTORS

A PATENT IS A VALUABLE RIGHT

On the basis of a constitutional provision Congress has established a system under which inventors may secure the exclusive right to prevent the unauthorized use, manufacture and sale of their inventions for periods of seventeen years. The inventor secures this protection by obtaining a patent from the United States Patent Office.

The United States Patent Office RECOMMENDS

in its Rules of Practice that "an applicant is advised, unless familiar with such matters, to employ a competent registered patent attorney or registered patent agent, as the value of patents depends largely upon the skillful preparation of the specifications and claims."

We RECOMMEND

that you authorize us to conduct a search through the U. S. Patents pertinent to your invention and submit a report setting forth our opinion regarding its patentability.

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EVANS & Co.**

Merlin M. Evans
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Washington 6, D. C.

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Address

City and State.....

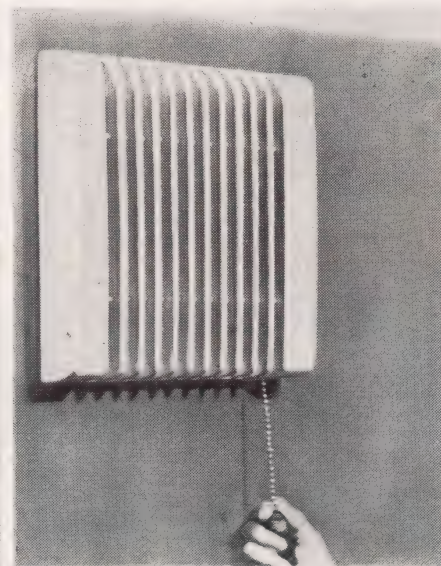


SWINGING IN THE HOUSE

Here's one to keep the youngsters busy indoors on dreary winter days. It's a swing that can be installed in any doorway and has a capacity of 200 pounds. The kit includes all parts required for installation. It is distributed by the Warehouse Point Co., Warehouse Point, Conn.

GLASS-FILLED PILLOW

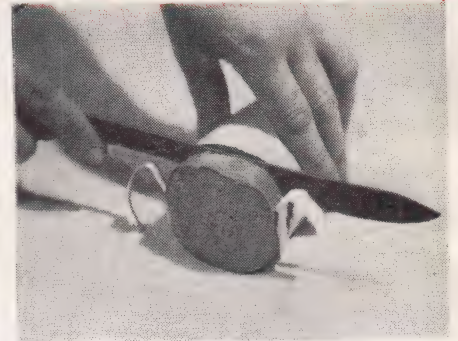
Victims of feather allergies should welcome a pillow filled with superfine threads of Fiberglas. The manufacturer claims that this product is lighter and more durable than pillows stuffed with feathers and similar materials.



VENTILATING BLOWER

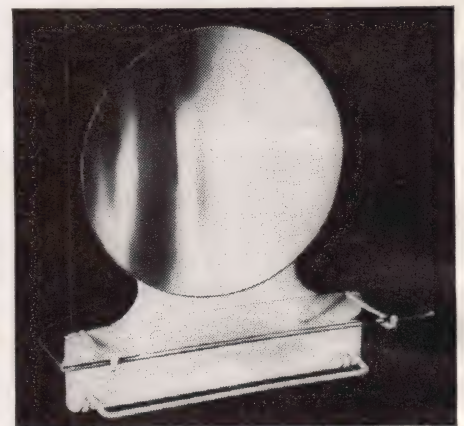
Another in the long line of room ventilators now becoming available is one produced by the American Blower Company of Detroit, Mich. The white plastic grille can be installed horizontally or vertically, and the three-bladed fan will move 400 cubic feet of air per minute.

WHAT'S NEW



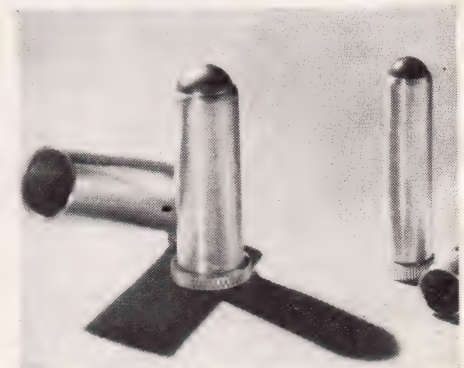
SELF-PEELING SAUSAGE

Liquid- and vaporproof pliofilm is now being used as a self-peeling casing for sausages. By dipping the finished sausage in hot water, the wrapping is shrunk so that when you slice the meat the covering peels itself out of the way. It also retards spoiling.



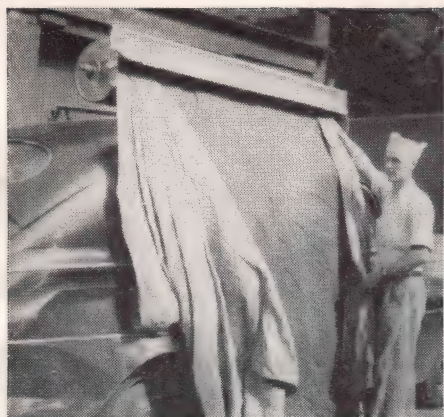
BATHROOM COMBINATION

The problem of where to put things in the bathroom is simplified by this combination including mirror, glass shelf, and white enamel towel rack. Affiliated Products Co., 154 Nassau St., New York, N. Y.



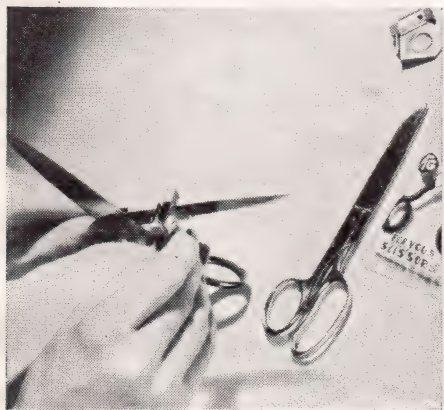
BALL-POINT LIPSTICK

A lipstick or lotion applicator now being produced for several cosmetics concerns has a ball point similar to those used in ball-point pens. The ball transfers the desired amount of the filler material to hands or lips. The container can be re-filled for use indefinitely.



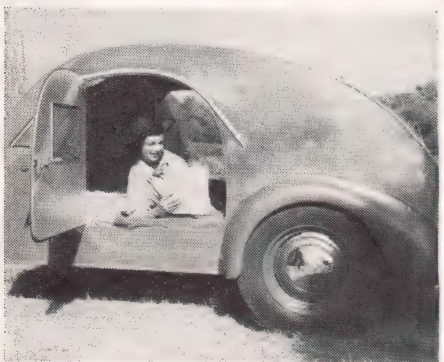
CANNED TENT

J. B. Kinney, an ex-G.I., of 1777 S. Marion St., Denver, Colo., makes a tent that rolls out of an aluminum cylinder on top of a car. The auto forms one side of the shelter, and the rest can be rolled out and pegged down in about two minutes.



SCISSORS SHARPENER

A simple sharpening tool for scissors is made up of a nickel-plated frame holding a carborundum stone at the right angle for producing a fine cutting edge. Distributed by South East Merchandise Co., 10521 Long Beach Blvd., Lynwood, Calif.



PLASTICS ON WHEELS

Plastic fenders that won't rust and are practically immune to scratching or bending are now a reality. Here they are shown on the Kit Kamper, a sportsman's trailer; some day you may find them on your car. Made by the Wills & Roberts Plastics Corp., Arcadia, Calif.

START TO SPEAK A FOREIGN LANGUAGE CORRECTLY *in only 7 days!*

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✓ FRENCH

✓ GERMAN

✓ ITALIAN

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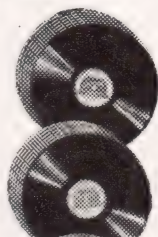
It's true, there really is a quick easy way to learn a foreign language. In fact, with the new 1946 Funk & Wagnalls Language Phone Method, you learn so quickly that within one short week you will be speaking phrases and even entire sentences correctly and fluently!

Think what this can mean to you! It can mean a better job and more money. It can mean successful business or social trips to foreign countries. It can mean the thrills of seeing new places, meeting interesting people, doing exciting things.

How Language Phone Method Works

Have you ever noticed how easily you acquired the tune of a new popular song? Well, that's just how easily you can learn to converse in another language—when you use the new *Language Phone Method*.

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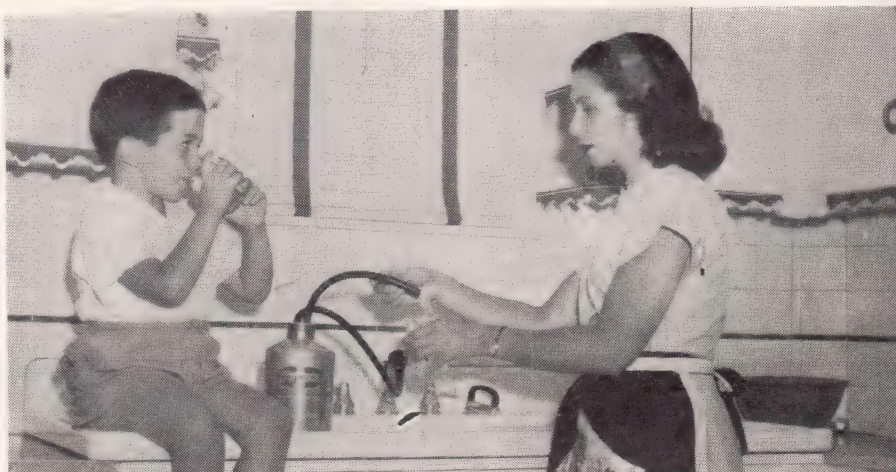
WHAT'S NEW



"VENETIAN BLIND" SCREENING PUTS PORCH IN SHADE

It's cool and shady behind KoolShade, a screening manufactured by Ingersoll Steel Division, Borg-Warner Corporation. Tiny

bronze louvers, woven into the material, stop the rays of the mid-day sun while freely admitting light and air.



HOME TREATING UNIT MAKES DRINKING WATER TASTE GOOD

Unpleasant taste and odor are removed from drinking water by a home treating unit that can be attached to any faucet.

Its chemical agent gives two years of average family use. A product of Richard S. Kastner, 4546 Richmond St., Philadelphia.



POSTWAR MICROSCOPE

An aluminum frame and a molded plastic barrel are features of a new low-priced precision microscope made by Testa Manufacturing Co., Los Angeles, for use by hobbyists and high-school students.



ELECTRIC MANICURE

Care of the nails is electrified in a "nail styler" made by Matthews of Erie, Inc., Erie, Pa. Resembling an electric shaver, the machine has attachments for buffing, filing, and cuticle treatment.

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CHUCK BLADE Guide Finished Holes Dowel

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ELECTRIC-HEAT SHAVER

The blade is kept hot while at work. Inventor M. M. Gravin says it's better that way because "the molecules at the cutting edge of the blade are set in vibration by 140-degree heat, therefore the blade cuts sharper and smoother." The shaver is made by Cords, Ltd., Newark, New Jersey.

FOR A GREASE-FREE KITCHEN

Pour a few spoonfuls of I. C. Degreaser in a greasy vessel, add hot water, let it stand five minutes, and wash off with cloth or dish mop; the makers say the chemical product will take grease off most anything. And no scrubbing. Made by Interchemical Corp., New York City. Sold by stores.



GUIDING GLOW FOR SWITCHES

You can install the Peralite in a few minutes, say the manufacturers. After that, locating the wall switch in the dark is easy. A tiny bulb in the top of a translucent plate is automatically controlled. Current cost, penny a year. Universal Microphone Co., Inglewood, California.

INVENTORS

THE Rules of Practice of U. S. Patent Office advise—unless the inventor is qualified to handle such matters—that he employ the services of a competent Patent Attorney in the preparation of his Patent Application. We are Registered Patent Attorneys fully qualified to represent you at the Patent Office.

Our long and varied experience in patent practice, we believe, enables us readily to understand inventors' disclosures, to advise what is probably patentable, after conducting preliminary patentability investigation of prior U. S. patents, and to draw your specifications and claims in such manner as to present clearly the novel features.

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Remember, the details of your invention do not have to be 100% perfect before you can obtain patent. Unwise inventors often devote considerable unnecessary time working on unimportant details of their devices. This is expensive, hazardous and unnecessary. First step is to have us conduct search for the prior U. S. patents and render a report as to its patentability.

Our search report is very valuable to you in that it clears up the course you should take in regard to your invention. If our Report is favorable, this report of the patentability of your device shows that your chances of patent protection are in your favor.

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Send me at once further particulars on how to protect my invention and include your "Invention Record" form. I understand that this request does not obligate me.

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INVENTORS

The inventor who believes he has a new and useful invention, and finds himself in need of advice, should consult a competent registered patent attorney.

The question as to whether a subject matter is patentable can be substantially determined by a search of the U. S. Patent records.

Without obligation, write us for information as to what steps an inventor should take.

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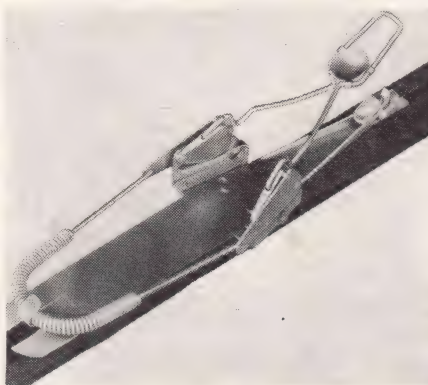
ONE-POUND RAKE

Aircraft aluminum for the business end of this lawn rake keeps its weight down. The wide, flexible tines, 18 inches in spread, tend to reduce lawn gouging and rake clogging. Head is in one piece, bolted to a fir handle. Joell Manufacturing Co. of Seattle calls its rake "The Smoothie."



BEAUTIFIED MOVIE SCREEN

Runner-up for permanent position in any home blessed with a movie projector is a new screen that's a reproduction of a painting when not in use. A withdrawing screen of Hy-Flect beaded material in the upper section of the picture frame is the trick. Radiant Mfg. Corp., Chicago 8.



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You step into the binding and punch down the front lever spring into closed position. That brings the heel cable taut and the welt springs and bottom ratchets into grips with boot welts. One punch undoes the grip; abnormal strains free you. Tavi Products, 509 Madison Ave., New York City.

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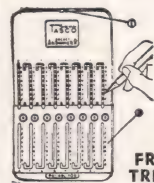
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Of SCIENCE ILLUSTRATED published monthly at Albany, N. Y., for October 1, 1946.
State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of SCIENCE ILLUSTRATED, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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McGraw-Hill Publishing Company, Inc.
Sworn to and subscribed before me this 24th day of September, 1946.
[SEAL.] ELVA G. MASLIN
(My commission expires March 30, 1948.)

KR ATTACKS CANCER

(Continued from page 32)

and with 10 cancerous mice injected with normal guinea-pig serum.

After 30 days, the cancers in the mice receiving the trypanosome serum were only one-third the size of the tumors in the other mice. Furthermore, when cancers were exposed to the serum before being transplanted into mice, they failed to grow in the usual way. All the mice survived.

In 1939, Roskin's wife, herself an expert in bacterial diseases, joined the project. Under her guidance, the laboratory at the Moscow Institute of Microbiology effected a 400-fold increase in the potency of the KR serum. She found that the active substance was produced within the trypanosomes, that it was soluble in water, and pure enough for trials with humans.

Dr. Roskin injected some KR under the skin of his own arm. He suffered only a slight fever. Next, three patients suffering from advanced cancers of the throat were injected with KR. The results were not striking, but the cancers did become less active.

In 1941 the work halted abruptly; Moscow was under attack of German guns. The trypanosome cultures were lost. However, in 1943 new trypanosomes were obtained from Dr. C. A. Hoare of the Wellcome Bureau of Scientific Research in London. He sent 13 infected Triatomas to Moscow by air. Only one insect survived, but that one enabled the Russians to resume their experiments in 1944.

U. S. doctors start check-up

Now KR was further purified and concentrated, and tested on human cancers. Results were better. Prof. V. K. Trutnev, a distinguished Moscow doctor, injected a series of KR doses under the shoulder skin of a patient suffering from a first-stage cancer of the vocal cords. The doctor reports that the tumor disappeared; and that after five months it had still not reappeared.

The Russian researchers are now working to provide greater stability for KR. At present it retains potency for only 10 or 12 days. And they also hope that within six months they can provide a serum 10,000 times more concentrated than the original. This should increase its effectiveness, for the rate at which the cancer disappears depends on the KR dosage.

This rate of disappearance must be controlled. If the cancer is destroyed faster than the normal tissues can heal, a gaping wound is left. So, in addition to improving KR, Russian researchers are studying ways to hasten this healing.

(Continued on page 88)

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For these reasons, American scientists join in the Russian's warning against sensational claims for KR. Interest among U. S. researchers is recent, despite the appearance of Roskin's papers as early as 1931.

For the past year, however, under sponsorship of the National Cancer Institute, Dr. Theodore Hauschka of Philadelphia's Lankenau Hospital has been checking the Russian work. Similar check is under way at Memorial Hospital, New York City. As a result, interest in this country has become so keen that Dr. Hauschka has accepted an invitation to visit the Roskins' laboratory to learn the Russians' methods and bring back some of their materials. (Trypanosoma Cruzi is so variable that results must be checked by using identical strains of the parasite.)

Confirmation of the Russian work may come from Chile, where the occurrence of cancer among sufferers from chronic Chagas' infection is being studied. Preliminary results suggest that cancer is rare in regions where Chagas' disease is common.

KR does not yet cure human cancer. But continued research may show that we can turn a death-dealing parasite into a powerful weapon against the dread disease. (END)

A SALUTE TO CONDON

(Continued from page 57)

when the United States first realized the enormity of its responsibility in holding atomic power within its grasp.

He became a professor again and gave to struggling senators and congressmen that essential understanding of atoms and nuclei, of chemistry and physics, that their nineteenth-century education had shamefully ignored. They got clear, intensive education in the realities from Dr. Condon. Those realities include the possibility of cataclysmic atomic warfare, but Ed Condon's mind characteristically turns to the alternatives: the era in which uranium chain reactions, releasing vast quantities of heat, will be used to make power for homes and industries. Said he recently:

"There is every indication that power from this source will have an important effect on the economy of ship propulsion, and also in the power supply of communities having neither water power nor a convenient coal supply."

Today the old Bureau of Standards is geared to the atomic age. And this young, keen scientist has cheerfully taken the lead in keeping the Government up to the minute in a race that will go to the quick, the strong, the happy, and the well-trained. (END)

SAFE MODELS: SAFE PLANES

(Continued from page 68)

At Newark Airport, pilot Lew Reichers was making a final low-altitude run for the benefit of the news photographers who had just watched him set a new speed record with a Burnelli airliner. As the ship sped past the cameras, the plane's aileron brackets let go and the control panels dropped from the wings.

Reichers found himself heading for the city of Newark at more than four miles a minute. The control wheel wobbled uselessly in his hands. Rather than risk a crash into the buildings or streets, he headed for what seemed certain death by gunning one of the two engines and throttling back the other so that the 14-passenger airliner would cartwheel wing-over-wing to the ground. The newsreels caught it all in some of the most spine-chilling action shots ever filmed.

When the wreck finally came to rest after plowing a canyon in the field, Reichers and the engineer who had ridden with him opened the cabin door and stepped outside for a smoke. The crash had hurled the plane's engines hundreds of feet. But the cabin was intact. The windshield hadn't even been cracked. The negligent mechanic who had caused this unscheduled test of stamina had left eight bolts out of the aileron brackets.

Since then, Burnelli has proved that his airliners actually can fly with locked ailerons. "We knew the model planes could do it," he says, "so Clyde Pangborn and I took one of the ships up with the aileron controls locked and landed it without a bump."

Now he's modeling a jet plane

Burnelli planes have all been spin-proof since 1927. In that year one of them flew around the United States with its cabin fitted up as a complete automobile showroom, cars and all.

Their designer is now working on a flying model of a jet plane. He believes the full-size version will be faster and safer than any previous plane.

"We can get the speed with jets," he says, "but we have to build in the safety—enough of it that even a crash landing won't smash the passenger cabin." And Burnelli is building planes with a reputation for safety. His planes have carried both freight and passengers over some of the world's most hazardous routes.

"It's the model maker in me that makes them safe," says the planes' designer. "I hope to see more model makers in the aviation business. It takes so much time and effort to make a good flying model that one gets the habit of making them tough." (END)

MICROFACTORIES

(Continued from page 50)

practical method of extracting vitamins directly from diatoms.)

Whether petroleum comes from the remains of untold myriads of the tiny diatoms, or from the remains of prehistoric fish that fed on diatoms, is not yet known. Anyway, credit for it is probably due the diatoms.

Once formed, diatom shells are almost indestructible. Their fossil forms are tens of millions of years old. It takes some 40 million diatom shells to fill a cubic inch, but in Lompoc, California, a deposit of shells owned by Johns-Manville goes down hundreds of feet and extends over 12 square miles. This and other deposits of "diatomaceous earth" are today among our valuable natural resources.

The unique physical and chemical properties of diatomaceous earth fit it for many industrial uses.

It is light, weighing as little as eight pounds to the cubic foot, or about an eighth as much as water. Extremely porous, it will absorb three-quarters of its own volume of liquid. Add to this its resistance to most acids and other corrosive substances and you have a safe vehicle for the storage and transportation of dangerous liquids. Nobel was one of the first to recognize the special value of diatomaceous earth when he used it to absorb nitroglycerin—and invented dynamite.

Many uses for diatom shells

Its porosity and insolubility also make it excellent for filtering sugar syrups, oils, cleaning solvents, plastic rubber, and medical serum. The fine, microscopic rasplike edges of diatom shells, too small to make visible scratches, make this earth an excellent polish for silver and other highly polished surfaces.

Diatomaceous earth is an excellent insulator against heat and sound. With a melting point of 1,750 degrees Centigrade, it is ideal for insulating high-temperature furnaces. It can be used to improve the quality of paper; it waterproofs and strengthens concrete; it makes ceramic glazes more brilliant. When added to paint, it acts as an emulsifier, makes the paint go further, and helps prevent blistering.

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1 Garnish your tree with horses of different colors. Cut out several at a time from layers of drawing paper and paste on a plaited hanging string, ribbon bow, and tail. Cover ends of string with cut-outs of colored tissue. Paint markings on head and paste on small gold stars.



2 There's plenty of brass on this redcoat. Belt buckle, epaulettes, and shako take bits of heavy gilt paper. Fuzzy scarlet textile pasted on both sides of paper cut-out serves for the uniform. Color shoes and visor with black ink; mark in the trouser line with pencil. Attach hanging cord.



3 Snow men are in season. Cut out this rotund figure from white drawing paper; dress it up with mittens and a gay bow tie made of green tissue paper. The top hat, of course, is the brightest red you can find. Bits of blue paper for the eyes, and red cut-outs for nose and mouth finish the job.

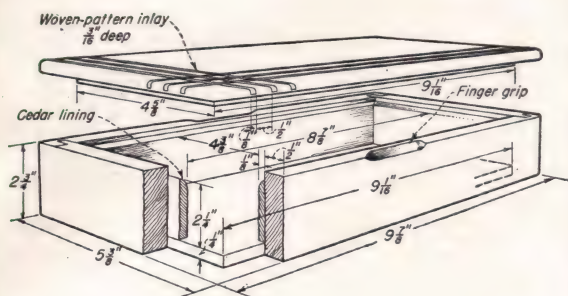
4 Silver stars and balls sparkle as these paper bells swing in the light. Three circles of red paperboard are folded twice across the diameter at right angles, then folded again into thirds. When opened, the circles form into bells. String on a cord, with knots for separation.

5 A jovial Santa Claus guards this paper candy cone, which is cut in one piece from heavy red paperboard and trimmed with varicolored tissue bands. Paste on a simple insignia cut from metal foil. Snowy cotton wads make up the mittens. Gummed Santa seals liven up homemade decorations.

6 Save the cuttings when you open vacuum-packed coffee, meat, and sardine cans. The coiled tin strips stretch open into neat, flexible spirals which can be dipped into enamel for bright color effects. Remove the can-opener keys and replace with coated wire hooks for hanging on tree.

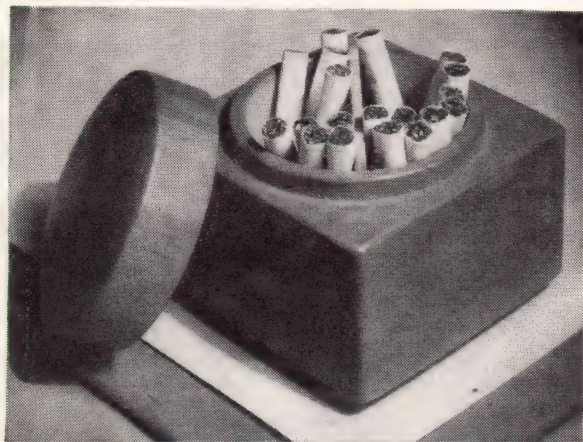


Christmas WOODWORK



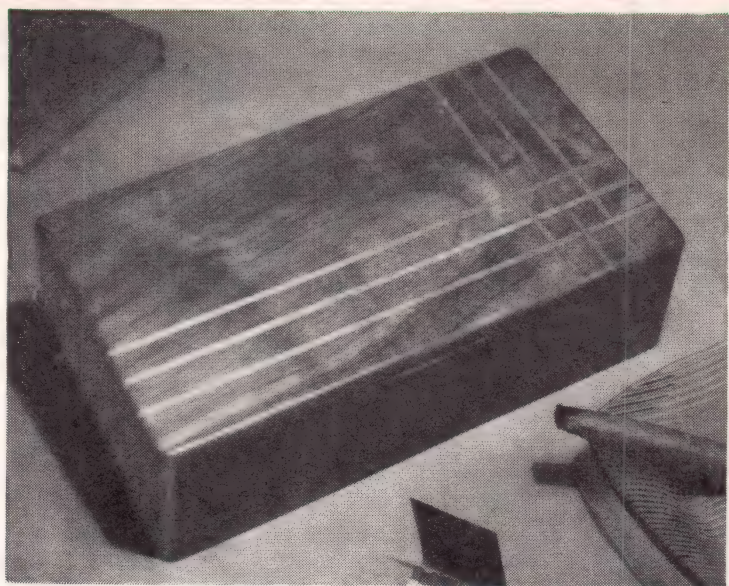
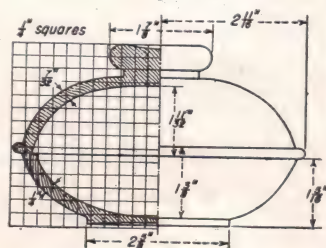
Humidor

Mahogany, walnut, or other dark wood should be used in this project to provide contrast with the maple inlay on the lid. Parallel cuts for inlays may be made on the circular saw, or by hand with cutting knife and chisel. The cutaway drawing shows the details of side and bottom construction. Casein or other light-colored



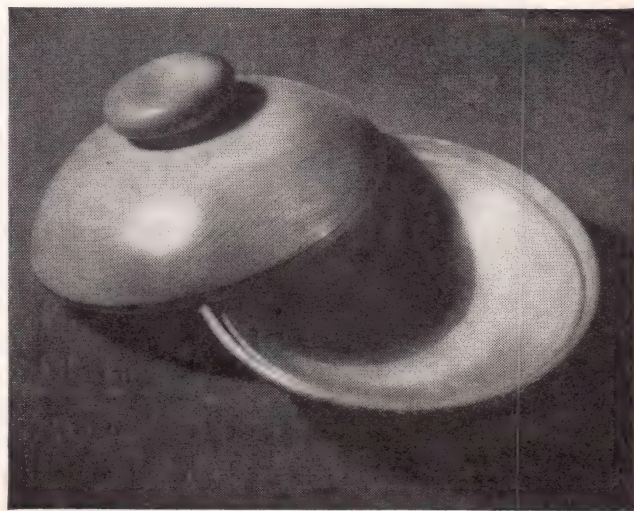
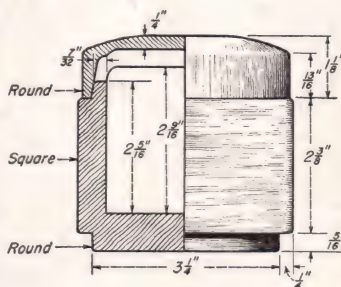
Powder Box

Here the wood is turned in two parts, each being almost completely finished without removing it from the lathe. The bottom is made first, and sanded and waxed while still mounted. If preferred, a lacquer finish may be applied. The lid is turned next and fitted to the recessed bottom. After finishing inside and out, the knob, by which the part is mounted, is separated from the stock and finished on its upper surface by hand. Contours of both parts can be determined from the squared drawing. Templates made from a full-sized drawing are used to check the work.



Cigarette Box

A small scrap block of any hardwood is all the material required for this modern cigarette box. The main body of the box is left square and the lid and base, both inside and outside, are lathe-turned to the dimensions indicated on the drawing. A flat wooden partition across the inside of the box holds the cigarettes upright. Finish may be either wax or lacquer. A felt pad glued to the bottom completes the box.

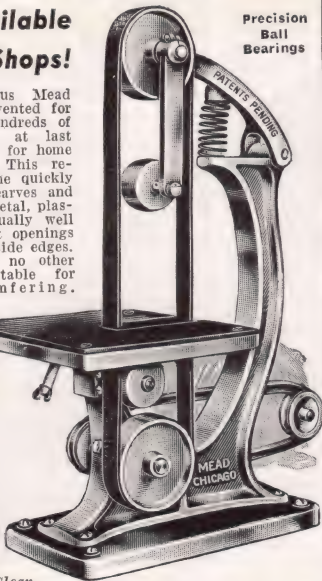


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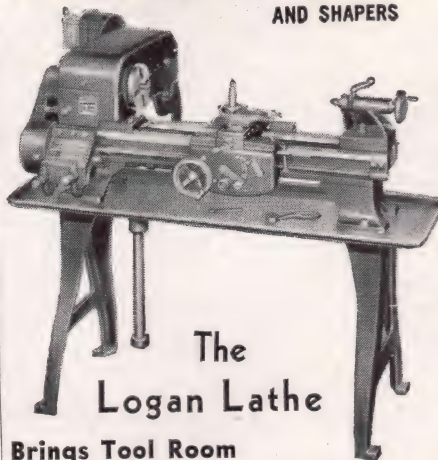
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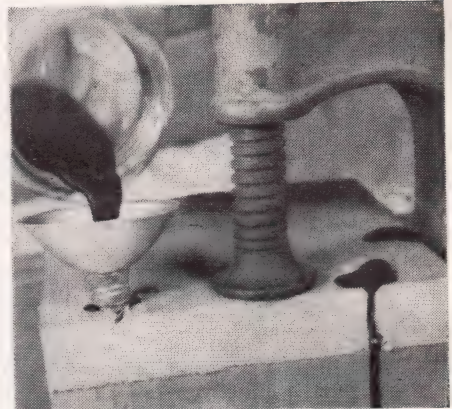


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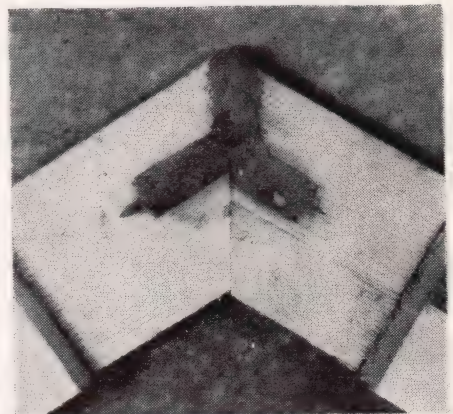
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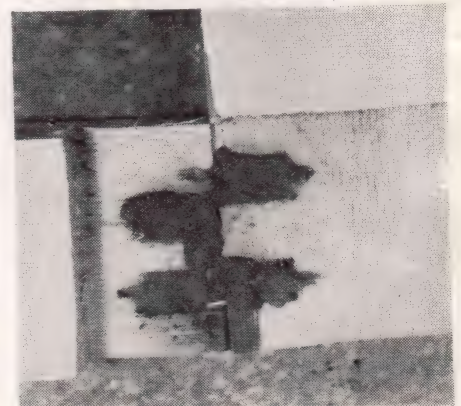
Liquid Nails



END-GRAIN JOINTS can be bonded with cold-setting phenolic glue like Cascophen or Bakelite BC-17613. Glue is poured into holes drilled through side pieces into end grain. A small funnel is used as above. A C clamp holds parts tightly until glue sets.

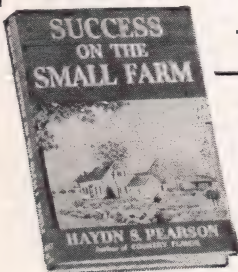


MITER JOINT has been cut away in photo above, to show hardened plastic dowel formed by the glue. Joints of this type may be filled through a hole drilled into any part of the channel. After the glue has set, filler hole must be sanded smooth.



ALIGNMENT of holes is not important, as can be seen from the photo of cut-away joint above. Unlike wooden dowels, plastic ones formed by the glue provide adequate strength though considerably out of line. Glue must be thin enough to assure filling.

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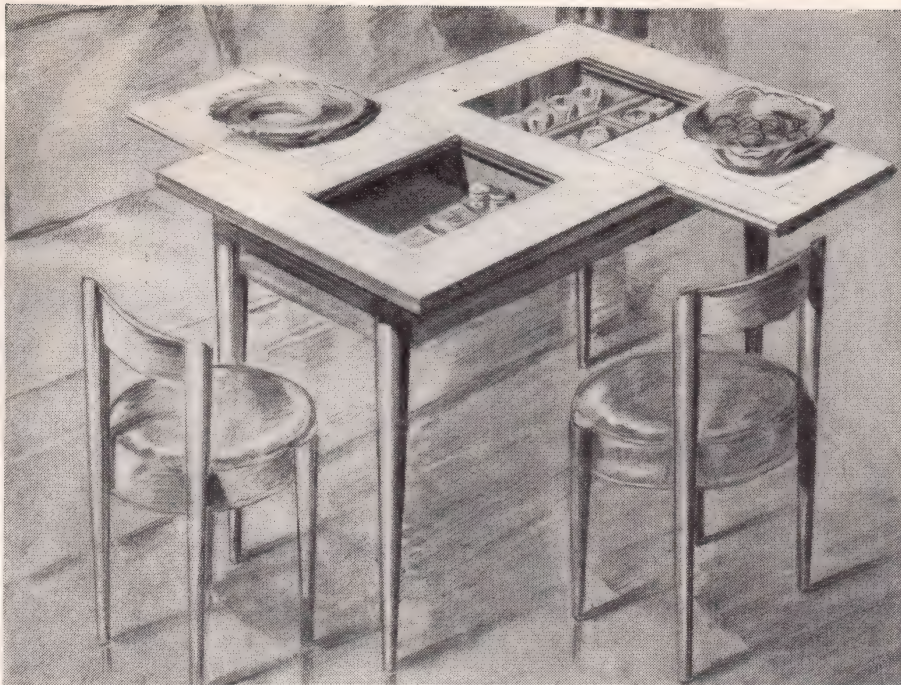
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DON'T GET UP—the silverware is right in the sliding-panel compartment!

Sliding-Panel Table

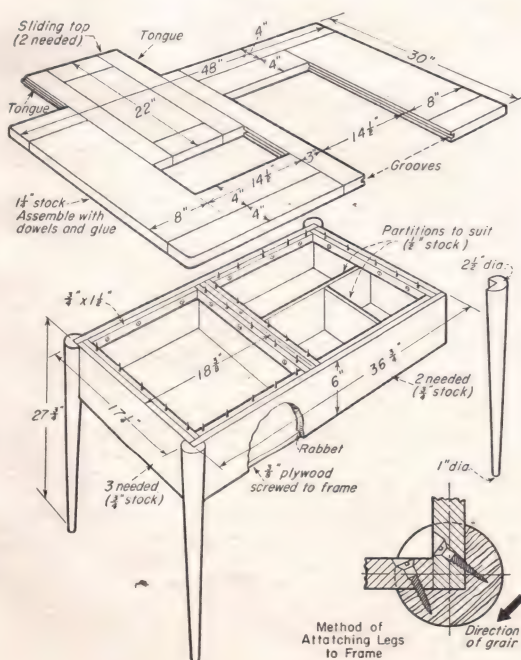
A DISTINCTIVE variation of the modern table is afforded by top panels that slide open to uncover recessed compartments in which cocktail glasses, silverware, knitting, or games can be stored. The table design presented here is an adaptation of one exhibited at the Salon des Artistes Decorateurs, Paris. It makes a handsome and sturdy piece of furniture in natural-grain finish.

The table top of 1¼-inch mahogany or oak stock is assembled from nine pieces to prevent warping. Adjoining edges of boards may be beveled to form ⅛-inch V joints, which will blend with the lines of the sliding panels. Each of the panels is built of five parts, with tongues on both sides to slide in the grooves cut into the top sections. Finger grips should be indented in the undersides of the panels, which should have enough play to slide freely.

The tapered legs are notched near the top for the rails, which are attached as shown in the drawing. The rails are rabbeted to support the compartment's plywood bottom. Partitions dividing the compartments are glued in place.

Dowels are used throughout for the table-top assembly. The application of modern phenolic glue to the top rails before these are joined to the legs will reinforce the joint for rigidity without the need of bottom stretchers, which would limit leg room.

Matching benches or chairs can be built of the same materials by following the general pattern of the table. Circular seats covered with pastel-shade material will harmonize with the table.



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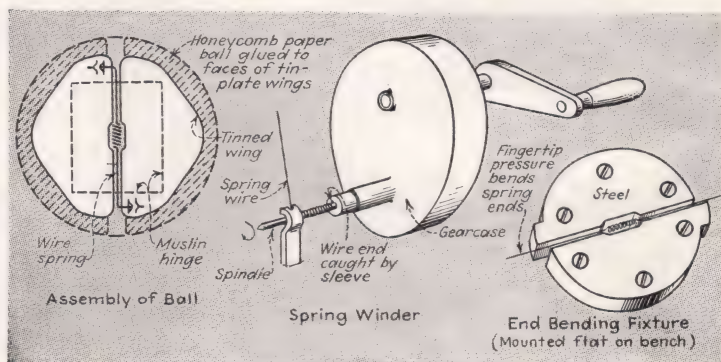
MAGIC from the Workshop



WHEN THE BOX IS OPENED the balls begin to pop out. A bushel of them springing from a 2x4x8-inch box is a surprise for anyone. Sam Adams delights in this exhibition of one of his tricks. Sketches at right show the craftsman how the balls are made at the Adams factory.



BLACK WIDOW, with authentic-looking spidery legs, usually sells for a dime. Roaches and flies are only a nickel, but don't give half the scare. The horrendous insects have lead-cast bodies, sheet-metal or wire legs. Other Adams gags include an ink spot blanked from steel and painted black, a toothless comb for bald-headed men, a rubber kiss stamp, proverbial left-handed screwdriver.



MYSTERY EXPLAINED. Two steel wings are hinged with muslin and forced together by a coil spring. Glued to the wings is an opened honeycomb paper ball. Wings are folded to compress the balls for stacking.

THE proof that everyone—or nearly everyone—enjoys a joke is in the fact that the S. S. Adams Company has sold several million of its patented Joy Buzzers, and this most popular “Adam’s rib” is still selling in the hundreds of thousands annually. The buzzer, which has a clockwork that operates a vibrator, is concealed in the hand. Henry Ford livened up his inspection tours of his plants by giving “shock” handshakes to his foremen. G. I.’s loved it; and one of them shook hands right into a flock of presents and a witch-doctorship in the South Pacific.

Adams has invented so many popular trick devices that he is regarded as the top American jokesmith. His Bingo, a miniature trap that fires a percussion cap, has been applied to match books, cigarette packs, books, and various containers. All his mechanical gags depend on surprise.

The home craftsman who makes some of these tricks himself gets an additional element of fun.

Here's an interesting
and useful hobby that calls
for a bare minimum of tools

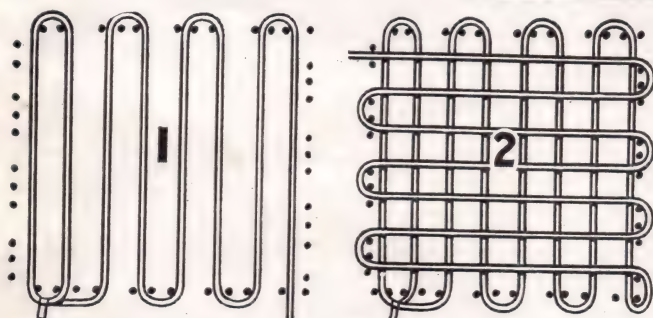
DURABLE and novel rugs can be woven from rope as illustrated in the diagrams below. One-by-three-inch stock is used for the frame that holds the 26-inch square of finishing nails over which the weaving is done.

A square knot holds the rope at the "start" corner, and another holds it at the finish. After the first three layers across the frame are completed, the weaving begins. It is a simple matter of leading the rope over and under alternate strands and pulling tight at the row's end. The course of the rope back across the frame is shown in the weaving diagram. Ninety yards of $\frac{1}{4}$ -inch rope are required for each square. When the weaving has been completed, and the rope knotted at the end, the frame is inverted and the rug worked off evenly all around.

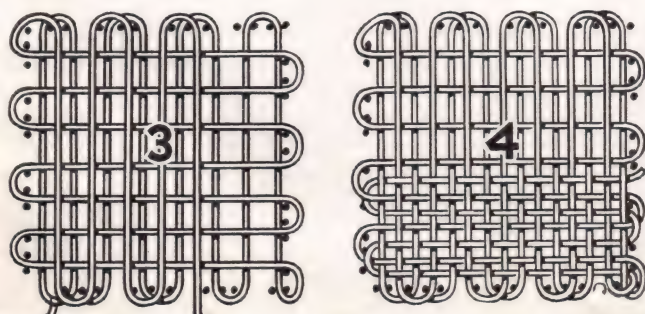
Nylon rope, if available, provides elasticity and makes the rug easy to clean. Cotton rope, as used in the original, can be kept from kinking by feeding it through a $\frac{1}{4}$ -inch inside diameter tube inserted along the rope's over-under path.



RUGS from Rope

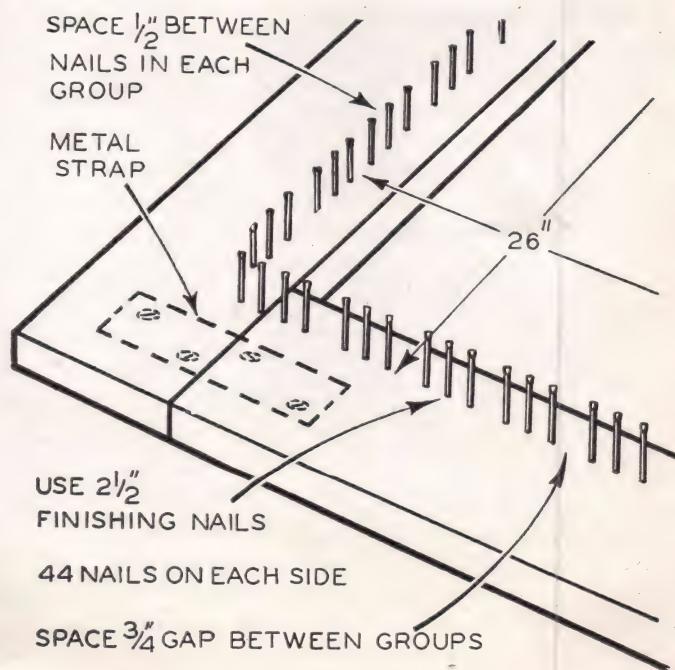


START rope as in diagram 1. Follow path shown so that the next parallel layer (3) can take the remaining path. Single length of rope is used for each mat. Corner turns (2) carry rope through right angle, to pass over the preceding layer.



THIRD LAYER parallels first and forms the base for final weaving (4). Rope is pulled tight after each pass across frame. When finished mat is removed, the taut rope returns to its original length, closing mesh of the weave

WEATHERPROOF and long-wearing, rugs of woven rope may be used indoors or out. Each square is a complete mat. If larger sizes are desired, the squares are sewn together with cord. Squares woven of nylon rope will shrink to 24 inches square when removed from the frame; from cotton rope, the squares will be slightly larger.



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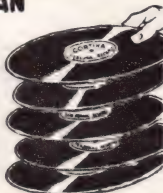
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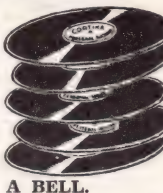
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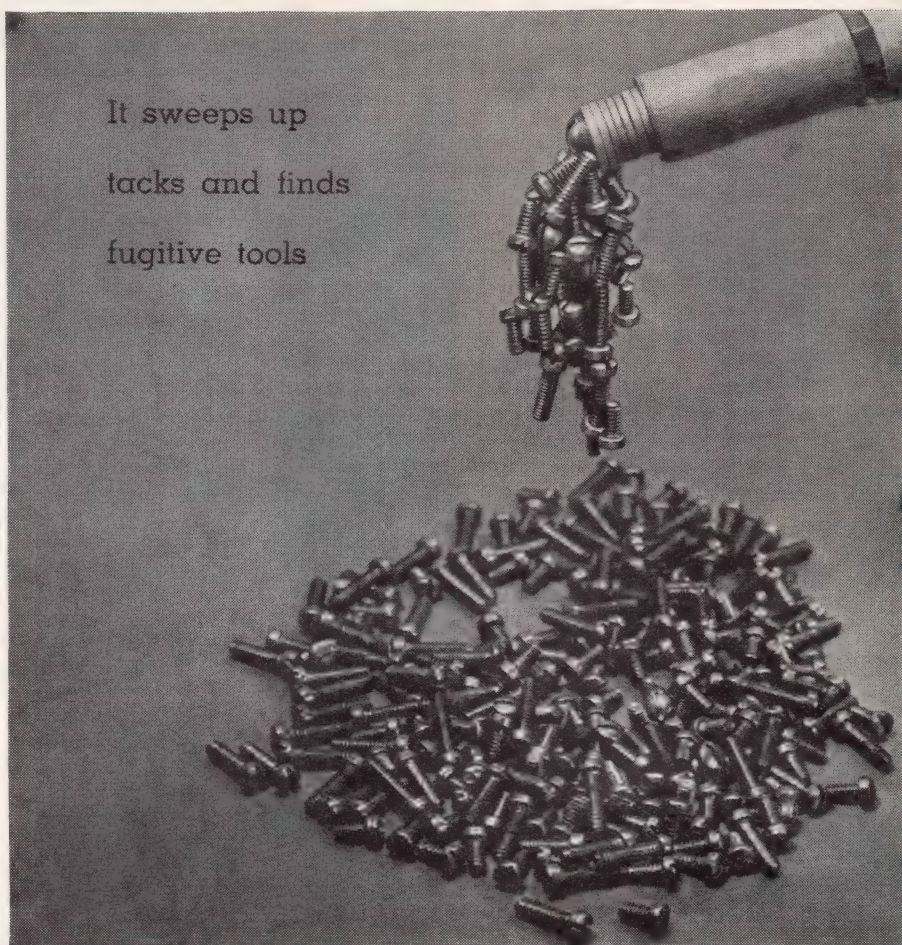
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Magnetic Broom

It sweeps up
tacks and finds
fugitive tools



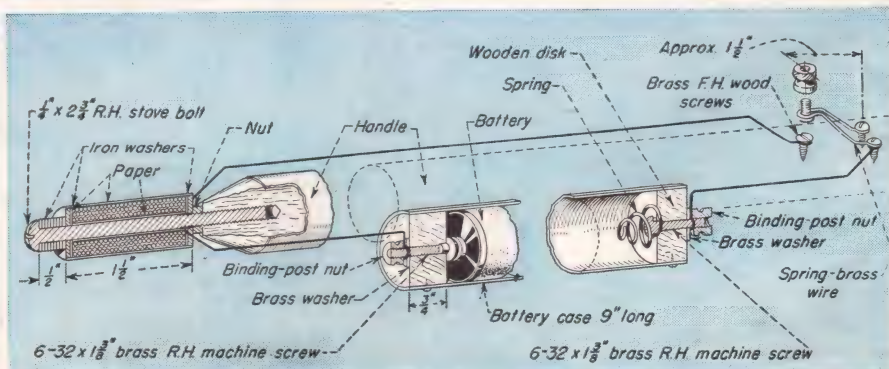
Walter E. Burton

DRIPPED tools and steel parts can't hide from a magnetic "broom" on even the most littered workshop floor. In the time wasted on a few vain hunts for missing parts, you can make an electromagnet that speedily picks up spilled nails, separates metal parts from sweepings, and fishes tools from hard-to-get-at places.

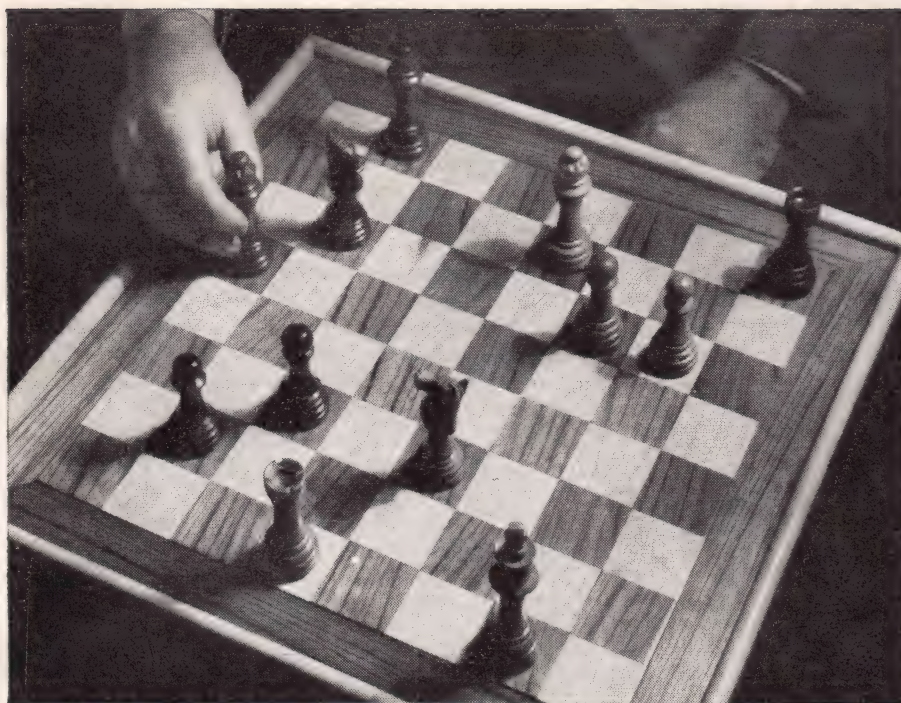
The magnet, powered by three size D flashlight dry cells, will lift any

quarter-pound tool, such as a pair of pliers.

An old flashlight case, mounted about midway on a full-length broomstick, holds the battery. A 1/4-inch stove bolt forms the core of the electromagnet. Before winding, the bolt should be heated to cherry red and allowed to cool slowly to remove any hardness. A set of dry cells should last several months.



MAGNET CORE tipped with 1/2-inch stack of iron washers has two 11/16-inch washers, with paper insulators, set 1 1/2 inches apart for winding. Use No. 23 B & S magnet wire, with paper between layers. Nut is then tightened down. Wire the circuit as indicated.

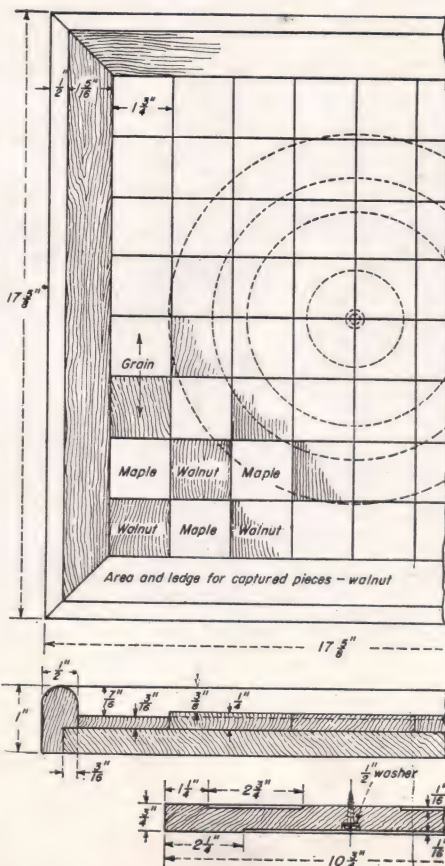


Chessboard on a Turntable

For switching colors at the end of a chess game, merely rotate this chessboard on its turntable to get the squares in proper position. Or, if involved in a puzzling book game, you can revolve the board now and then to get the opposing point of view.

The chessboard is made of $\frac{3}{8}$ -inch plywood, $17\frac{1}{8}$ inches square. Cut the required 32 squares from $\frac{1}{2} \times 1\frac{3}{4}$ -inch walnut and maple. Straight strips are tacked down temporarily at right angles, $1\frac{5}{16}$ inches from the edges of the plywood, and the grain-matched squares are glued in a checkerboard pattern into this area. A walnut frame, of $\frac{3}{16} \times 1\frac{5}{16}$ -inch mitered strips, is fitted and glued into place. After the glue has set, a mixture of fine sawdust and glue is scraped over the surface to fill any indentations, and the board is sanded smooth. Maple molding, $\frac{1}{2} \times 1$ inch, is rabbeted to fit the edge of the plywood and glued around.

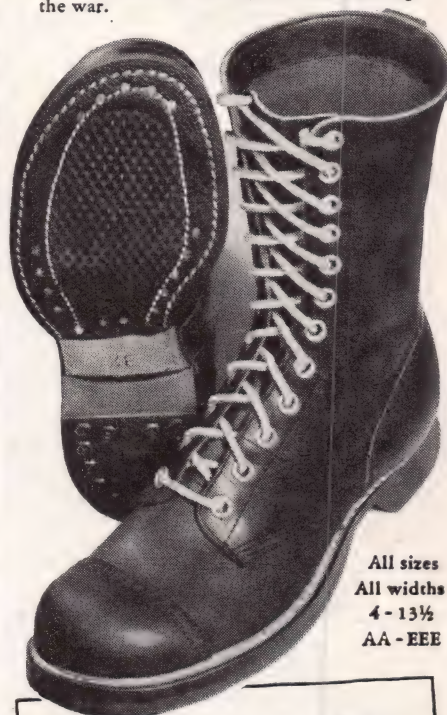
The turntable is made of $\frac{3}{4}$ -inch whitewood, cut to a $10\frac{3}{4}$ -inch circle. Channels are cut on a lathe, and over-size centerhole drilled for the wood screw that will be fitted through a countersunk washer to the chessboard floor. The screw should turn freely and not be long enough to protrude through the face of the board.



Section through turntable.



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FEW sports offer greater thrills than skate sailing. Most of the sails are simply constructed of spruce spars and rattan bows with a covering of about five-ounce sailcloth. Their weight runs from 14 pounds upward. Metal ferrule joints in spars and bows make it possible to dismantle the sail and pack it in a six-foot container. Sail areas vary from about 44 square feet to more than 80. The weight and skill of the user are the main factors in determining the area that can be carried.

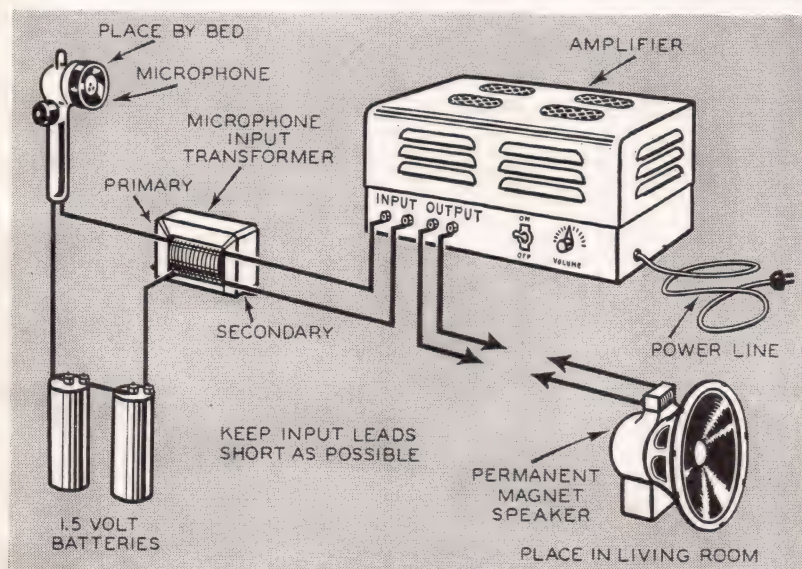
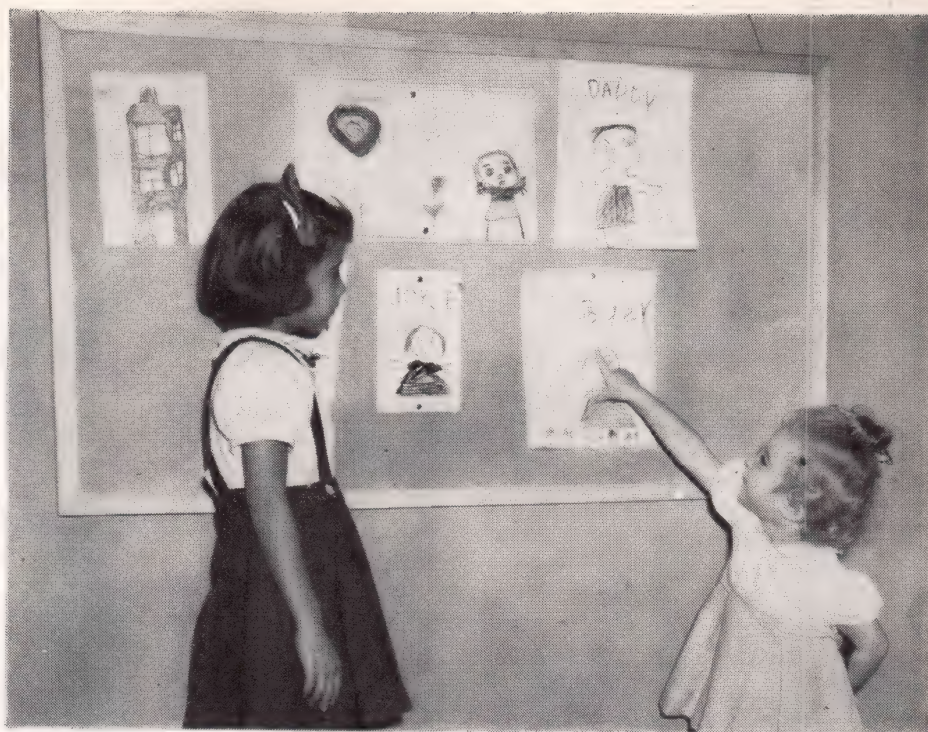
Long-bladed skates, such as racing skates, are used to give adequate control at speeds estimated at close to a mile a minute. Because of its high visibility, orange is gaining popularity as a skate-sail color to permit racers to see their rivals through the tiny plastic windows in the sails. The Skate Sailing Association of America provides plans for making the sails, and registers the completed equipment for competition.



For the Kid's Room

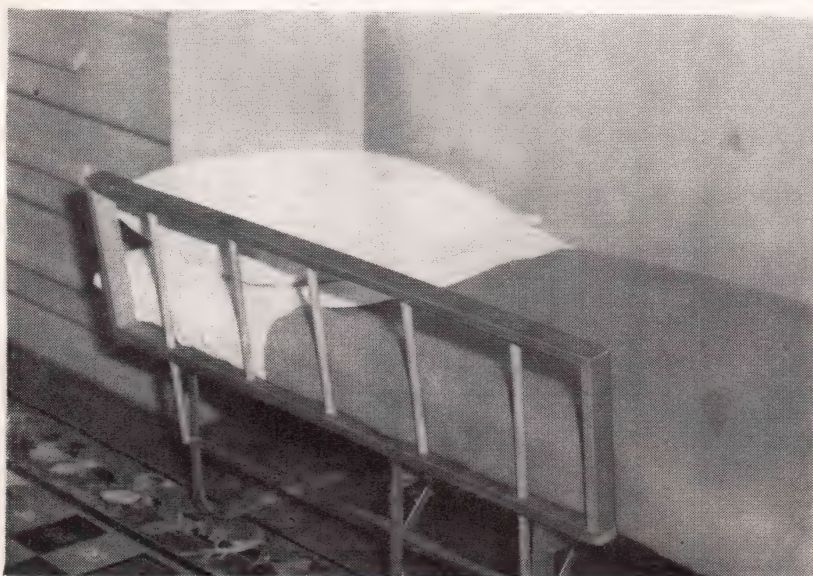
Pin-up Art Board

YOUNG artists may display their masterpieces without ruining the wallpaper and plaster, if you provide them with an easily made pin-up board. The frame is made of molding in which a rabbet has been cut to form a lip for the board of Celotex or similar soft material. A good size for the frame is 24 by 30 inches. Miter the corners and join with brads or corrugated fasteners driven from the back. The board is attached with screws and glue spread along the molding lip. Attach hanging brackets and finish by sanding and waxing.



Electronic Sitter Minds the Baby

YOU can close the nursery door and let the baby sleep while you entertain, with this modern intercommunication system keeping watch and bringing you every sound from the crib. The arrangement shown in the drawing at the left calls for an inexpensive microphone, amplifier, and speaker. If you are handy with radio you can hook up your household set to eliminate all but the microphone, or your radio service man can do it for you. With suitable extensions, neighbors in apartments or double houses can watch over each other's youngsters without going outside their respective homes.



Bed Guard for Rollers

FOR the youngster who wants to sleep in a "big" bed but isn't old enough to keep from rolling off, a bed guard does away with propping chairs against the bed. It is made of 1-by-2-inch molding, mitered at the wider side and joined into an oblong. Holes are drilled halfway through the top and bottom rails, from the inside, to take 1/2-inch dowels, which are glued into place. At two points, holes go completely through the bottom rail for longer lengths of dowel, which go down along the cot posts to the floor. Eye bolts screwed into the posts hold the dowels. If the cot has no middle post, an angle iron can be clamped to the cot rail at that point. The wood should be sanded smooth and finished with a coat of wax or shellac.

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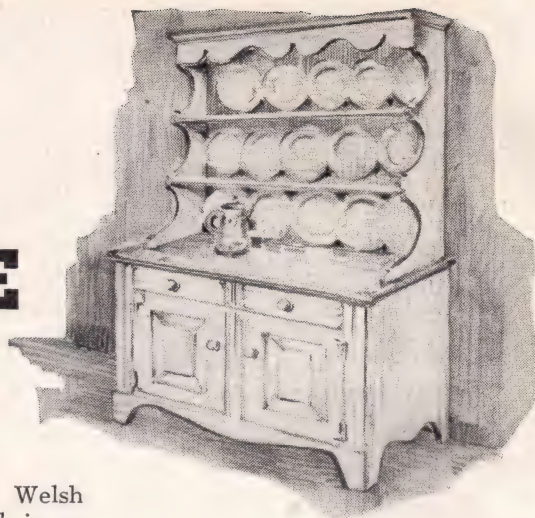
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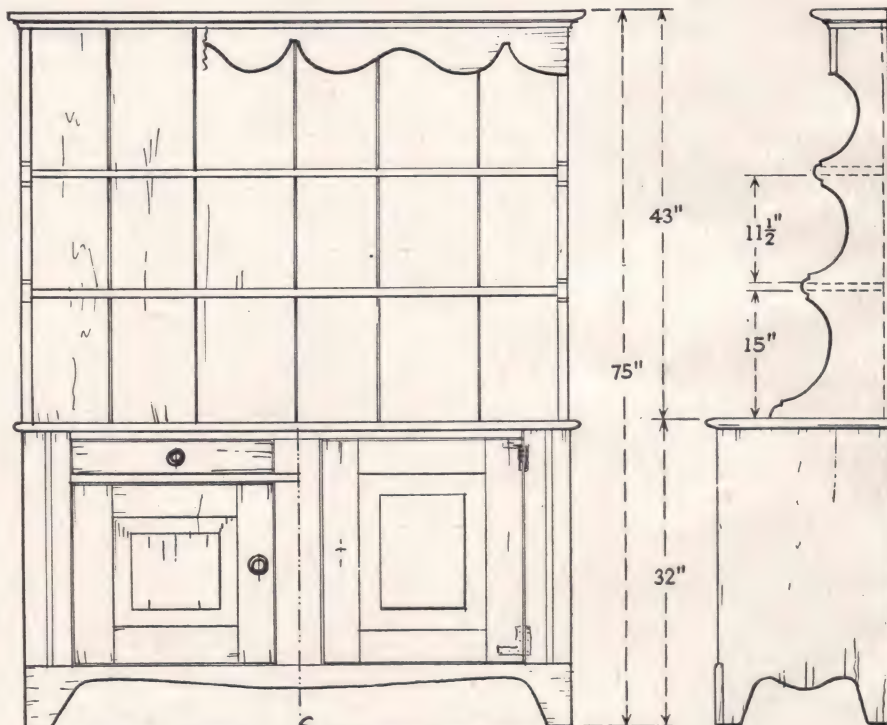
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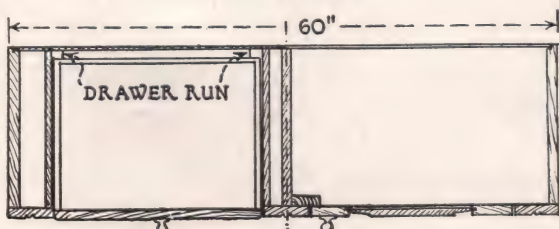


THE character of the Welsh dresser and sideboard is so basic it combines modern functionalism with the decorative qualities of primitive furniture. The adaptation shown here, designed for construction by the home craftsman, retains the time-honored lines of the antique. The top section is an independent unit, fastened to the lower section with cleats. Plywood may be used for the back, but thin boards of random widths are more characteristic. A water stain, sealed with a shellac coat which is all but sanded off and followed with several coats of tinted wax, give the desired patina and depth of color.



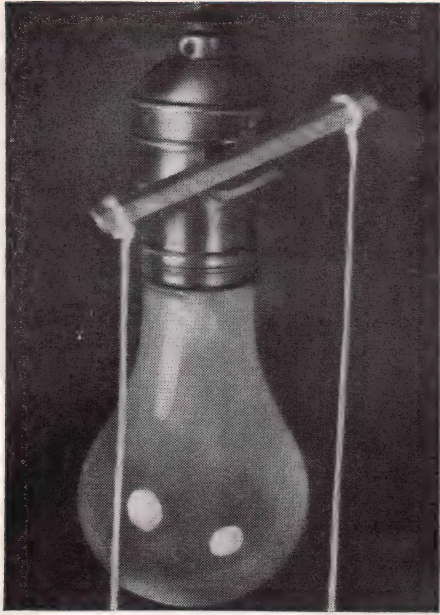
Drawings by Joseph Aronson

SECTION



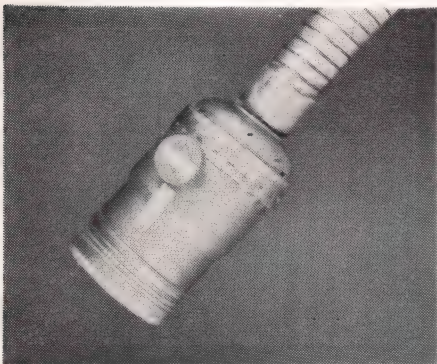
BATTEN DOOR may be substituted for the panelled door. Drawers are optional. Topmost edge of cupboard is finished by application of profiled cove molding.

Electrical Hints



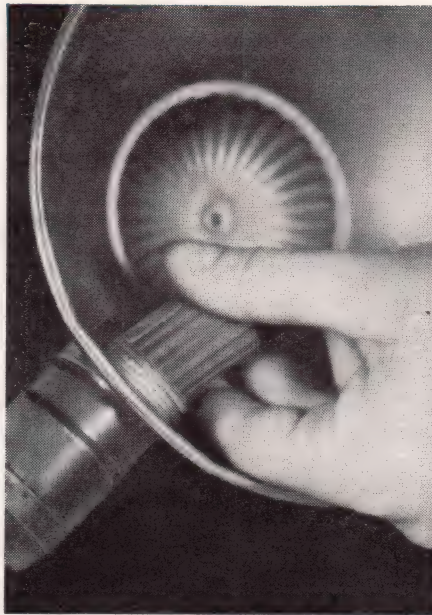
Improved Pull-Chain Switch for Hard-to-Reach Places

If you can't get a pull-chain socket for that ceiling light, you can adapt a thumb-switch socket for the purpose. Cement a wooden or plastic arm across the thumb switch as shown in the photo above, first making sure that the switch is reversible. With strings attached to the ends of the arms, you can turn the light on and off conveniently by pulling the cord that is up.



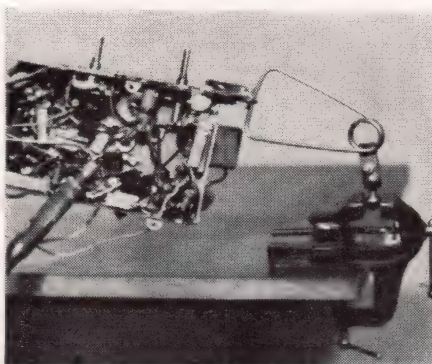
Paper Indicator on Switch Knob Tells Whether It's On or Off

Many switches with round knobs have no indication of the "on" and "off" positions, and this makes it difficult to tell quickly whether current is reaching appliances such as electric irons and heating pads connected to them. Small strips of paper cemented to the switch knob and the shell, as in the photo above, show at a glance if the current is on, even if the fact is not apparent in the appliance.



How to Get a Broken Bulb Base Out of the Socket

Removing the base of an electric light bulb that breaks in the socket is a safe and simple job if a short length of garden hose is used as a tool. The ends of the hose must be cut squarely and smoothly to give a firm grip on the broken base. Be sure the current is off before you do the job; otherwise you may get a shock or cause a short circuit in your wiring system.



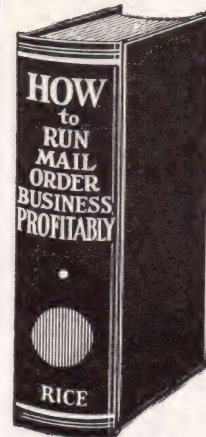
Reflector Clamp Holds Radio Chassis for Soldering Work

Radio-chassis soldering is made easier if the part being worked on can be held firmly in the desired position. A photographic reflector clamp held by its base in a bench vise can be used to support the complete chassis at the most convenient angle for soldering. The ball-and-socket joint in the clamp permits position changes as the work goes on, giving access to parts that would otherwise be hard to reach.

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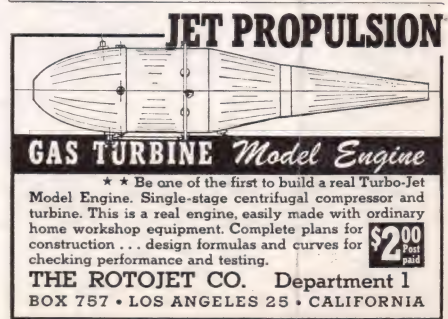
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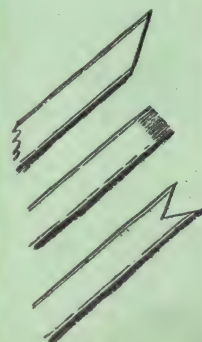
Ribbon loops are
the start of a bow.



Fine wire binds
loops at center.



This knot holds
the extra bows.



Ribbon ends are
cut or fringed.



SQUARE KNOT holds ribbon ends where they meet on top of
package. It is concealed by the looped bow placed above it.

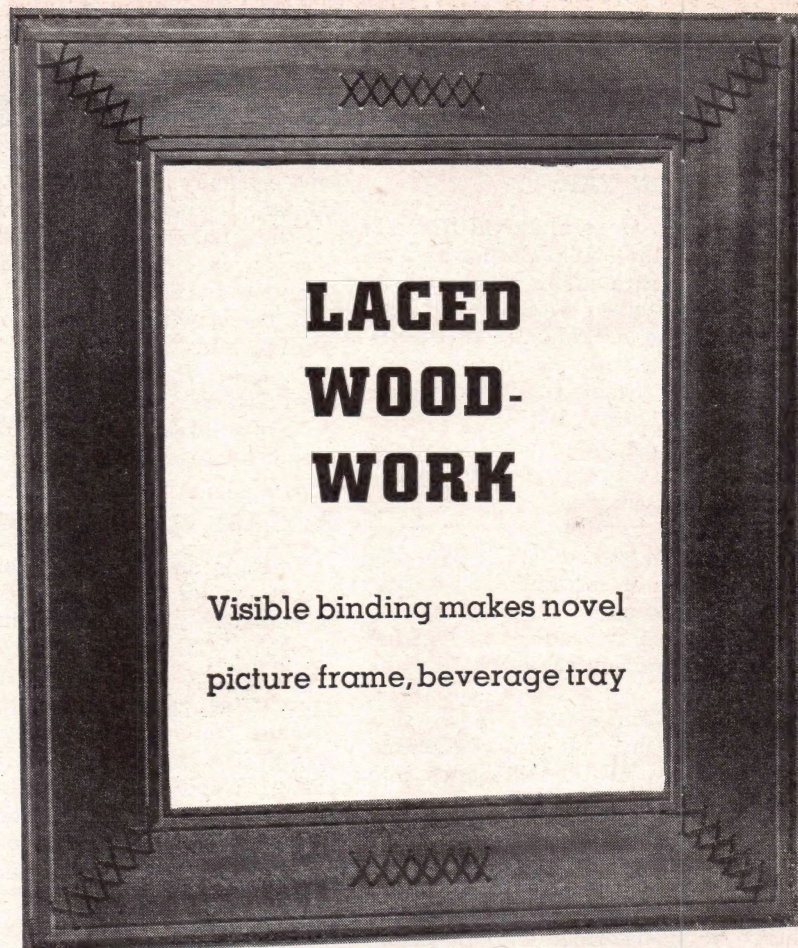
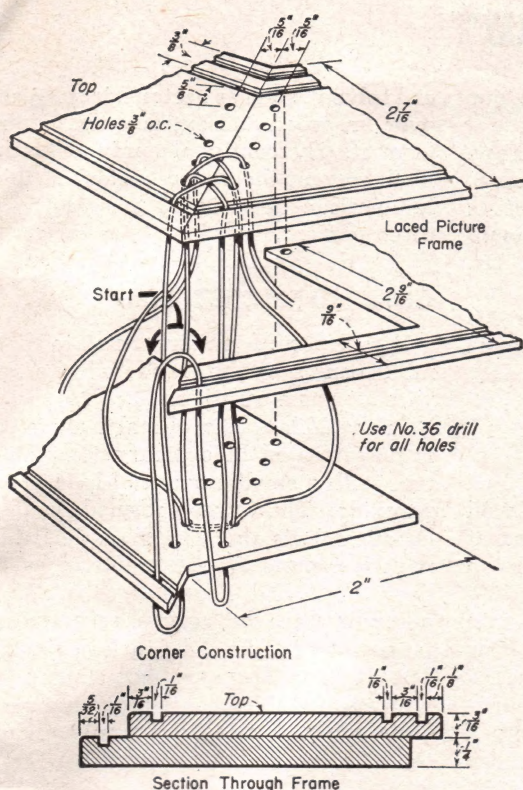
Gift Wrapping

THE beautifully wrapped Christmas packages that you
see in window displays are not difficult to duplicate at
home. One of the most important factors is patience.
Before beginning to wrap a package, measure the paper
carefully by rolling the box along it. Allow for about
1/2 inch overlap at the seam. When wrapped around the
box, the paper should protrude far enough beyond the
ends to permit folding over to cover them. Fold the top
of the protruding portion downward first, then fold in
the sides, and finish by folding up the bottom and stick-
ing it with Scotch tape or a Christmas seal. Ribbon is
wrapped around, tied with a square knot, and decorated
as shown.

Dennison

TWO BOWS may be used on large packages. One is held by the
knot shown at left, the other by wire or string at end knot.





DOUBLE FRAME consists of eight members, with backing frame staggered to offset corner joints. Drawing shows lacing steps.

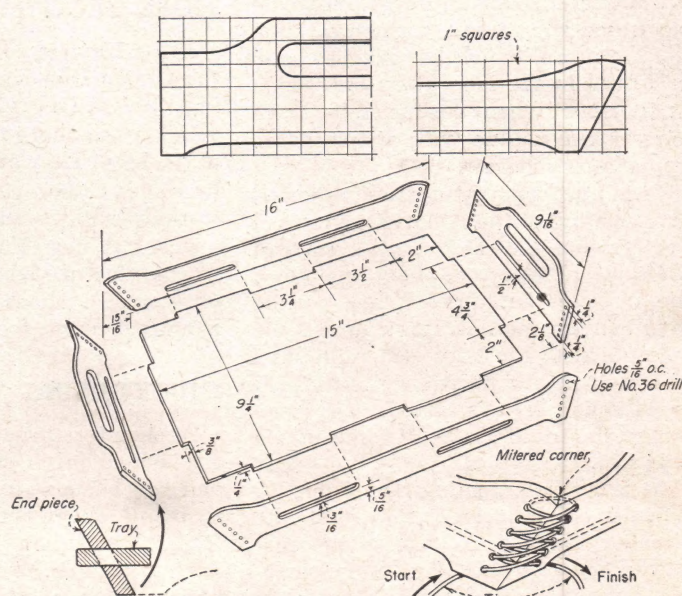
A WHOLE series of novel projects that do not require the use of power tools are exemplified by the laced picture frame and wooden cocktail tray. The laced units have surprising rigidity. Measurements may be altered to any desired dimension. Waxed cord, fishing line, or colorful plastic braid will make attractive lacing.

Wood molding or opaque plastic sheeting is used for the top section of the double picture frame. Lay out the holes

on the top frame, clamp pairs together, and drill through. Mark pairs for assembly. The lacing starts from the back at each corner, and ends at the back. The center lacing in top and bottom sections is added for decoration. The step-back in the top frame makes a rabbet deep enough to hold a glass. Lacing for the tray starts at the bottom, comes back through alternate holes for extra strength, and is tied under the bottom board.



TRAY SIDES are cut in pairs, from profile patterns, with a coping saw. Edges of the bottom board are beveled to conform to the angle of the side pieces. Corners of upright sections are mitered to get a neat fit. Lace upward, skipping holes for return pass.



THE MONTH IN SCIENCE

By GERALD WENDT

CLIMATE ON TAP

When Brig. General David Sarnoff, president of the Radio Corporation of America, celebrated his 40th year in radio (and received the SCIENCE ILLUSTRATED Award as "Man of Science") he predicted that the accomplishments of science in the next 40 years would dwarf those of the past 40. Said he:

"For example, man may learn how to deflect air movements with consequent changes in weather and he may discover how to neutralize a storm or detour it from its course. . . . We may yet have rain or sunshine by pressing radio buttons and . . . shall need a World Weather Bureau in which global forecasting and control will have to be vested."

Further, "The warlike idea that warm ocean currents could be shifted by science to turn fertile lands into deserts might be reversed in peacetime to modify or divert these currents to influence climate so that deserts would become gardens. With the aid of nuclear power plants desert areas might be transformed into habitable and productive regions."

MYSTERY OF THE MESON

What holds the atom together is still unknown. In the explosion of an atomic bomb, less than one percent of the matter that composes the exploding atoms is actually converted into energy. If all of it could be converted, almost a thousand times as much energy could be obtained.

The secret seems to lie with a particle called the meson, formerly called the mesotron, which has not yet been produced in the laboratory but which does occur when cosmic rays from outer space collide with atoms in the upper atmosphere.

Two California professors reported at a meeting of the American Physical Society that the meson has a mass of 200 times an electron, about one-tenth the mass of an atom. When cosmic rays release mesons from atoms, the meson exists for only two millionths of a second but its energy is as high as billions of volts. This makes the meson the most powerful force in the universe.

At the same meeting, Dr. John W. Wheeler of Princeton said that the discovery of how to release the untapped power of this elementary particle of matter might "completely alter

our economy and the basis of our military security."

Other nations have made more progress in this direction than U. S. scientists have, because our scientists have been too busy with atomic-bomb studies. In the Soviet Union, Dr. Alexander Pavlovich Zhdanov has been awarded a Stalin Prize for his discovery of a new type of atomic fission by cosmic rays.

A YEAST SUB FOR MEAT

Yeast is an excellent protein food and if available in quantity could well be substituted for meat during a meat shortage. The yeast plant lives on sugar and so can convert sugar into protein, as cows convert grass into protein. But sugar, too, is scarce. Now Dr. Robert S. Aries, of the Northeastern Wood Utilization Council, proposes the conversion of wood into a sugar that is good enough for yeast to live on. Thus yeast can make a substitute for meat from wood.

The Institute of Paper Chemistry at Appleton, Wisconsin, has in operation a project, supported by 12 paper companies, to use the waste sulphite liquor from paper mills as a yeast food. The primary purpose is to eliminate stream pollution from paper mills, but the product is yeast, which can certainly form a good animal feed, especially for poultry. But also possible is the production of human food from this yeast.

MORE FROG LEGS

From Havana comes the report that the Cuban frog-leg industry is booming. Science Service says Cuba last year sent us more than 300,000 pounds of the legs. They are not commercially bred, but Cuban cleaning and packing stations could send us 500,000 pounds a year. A new York firm now plans to manufacture handbag fittings, parts of women's shoes, and other items from frog skins, formerly wasted.

QUICK-DRYING LUMBER

A chemical process that can dry a 4 x 4-inch piece of pine in 27 hours, and may be made to do so in four hours, is being developed by the Western Pine Association in Oregon. Kiln drying of this size lumber takes 96 hours. In the new process a commer-

cial solvent, such as acetone, is sprayed over the wood and extracts the water from it. By continual spraying with fresh solvent the water content of the lumber can be reduced to as low as three percent.

COLD GERM-FREE MILK

Two reports from Europe state that milk can now be rendered sterile without pasteurization.

In the Milan area of Italy, all milk is now treated at ordinary temperature with a small amount of hydrogen peroxide. The oxygen formed by the chemical kills the germs so that the milk is completely sterile for at least three days and does not sour. The peroxide must be very pure and the process cannot be done in iron tanks. The Italians are now experimenting with a solid tablet, containing urea and hydrogen peroxide, that would make the process simple enough for any farmer.

In Paris, the retired director of the Pasteur Institute Laboratories obtains the same result by adding only two drops of a rare chemical, microlysine, to a quart of milk.

APPLE FLAVORING

When apple juice is concentrated by being boiled into a syrup it loses flavor. Now the Eastern Regional Research Laboratory near Philadelphia has developed a practical method for recovering the volatile "bouquet," so that it can be restored to the concentrated syrup and also provide apple flavor for other products.

INSECTS IN SERVICE

An Australian weed-eating beetle is being employed by Dr. James K. Holloway at the University of California Experiment Station of the U. S. Department of Agriculture to devour the Klamath weed, or St.-John's-wort. About 100,000 acres of California range lands are infested with the wort, and the beetle is particularly useful because it feeds only on this weed.

California grazers also plan to use two bugs of the squash type to stamp out the prickly-pear cactus. These bugs have long sucking beaks, with which they pierce the tough cactus pads, suck them dry, eat the flesh, and leave the cactus a shell.



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